



PHILIPPINE
FISHERIES
in CRISIS:

A Framework for Management

Philippine Fisheries in Crisis: A Framework for Management

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Cover: School of goatfish *Mulloidichthys vanicoiensis* (Lynne Funkhouser)

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List of Acronyms and Abbreviations

ADB	Asian Development Bank
AFMA	Agriculture and Fisheries Modernization Act
BFAR	Bureau of Fisheries and Aquatic Resources
CAM	coastal area management
CPUE	catch per unit effort
CRM	coastal resource management
CRMP	Coastal Resource Management Project
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DILG	Department of the Interior and Local Government
EEZ	exclusive economic zone
EO	Executive Order
FAO	Food and Agriculture Organization
FARMC	Fisheries and Aquatic Resource Management Council
FSP	Fisheries Sector Project
GDP	gross domestic product
GT	gross ton
ha	hectare
HP	horsepower
ICLARM	International Center for Living Aquatic Resources Management
ICM	integrated coastal management
LGU	local government unit
LMP	League of Municipalities of the Philippines
kg	kilogram
km ²	square kilometer
m	meter
MEY	maximum economic yield
MSY	maximum sustainable yield
NSAP	National Stock Assessment Project
P	pesos
RA	Republic Act
t	ton
UP	University of the Philippines
USAID	United States Agency for International Development

Exchange rate: P50 = US\$1.

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Foreword

Philippine fisheries, renowned for their biodiversity and value, but generally in a very poor state of health, are analyzed herein. There is an urgent need for better management and protection of these resources that contribute substantially to the country's economy and the livelihood of several millions of Filipinos, particularly coastal dwellers.

The authors provide a clear and alarming “snapshot” of fisheries in the Philippines. They analyze the causes of overfishing in relation to the biology and ecology of the stocks and how fisheries operate in their ocean environment. They show how as a society, we have not yet come to grips with the reality of overexploitation of our ocean resources because of the open access nature of fisheries and other coastal resources.

The socio-economic situation of the country is also described in the context of ineffective fisheries management. The message is that a lack of proper management not only erodes the resource but contributes to poverty and an inequity of benefit distribution. The increasing portion of total national catch by commercial fishing vessels shows this shift away from benefits accruing to municipal and small-scale fishers.

As a developing nation, the Philippines is very dependent upon fisheries natural resources, and needs to address urgently the pressing issues facing their conservation and management. If we are to continue to supply the country with export revenues, employment and food, then we must take a realistic look at what is happening to our fisheries in this new century.

This book also highlights that the tools required to protect and manage our fisheries already exist. Many examples of fisheries management are being tested around the country. But, these small successes must be implemented much more widely and directly supported by national and local policies. It goes without saying that managers need to be sincere and honest in their efforts to alleviate the ills befalling our fisheries, otherwise these will be exercises in futility.

I encourage you to read and make use of this book to improve our understanding of how to solve the fisheries management crisis in the Philippines. The common sense embedded herein might help save our fisheries!

Edgardo Gomez, Ph.D.

Pew Fellow in Marine Conservation

and

University Professor, the Marine Science Institute, University of the Philippines

Preface

This book helps us understand the value, status and situation concerning fisheries in the Philippines and the whole world today. It provides a reference for finding and citing information required to make informed decisions about when and how to manage and improve the fisheries and other coastal resources in the Philippines. It can be used to convince ourselves and others about the need to plan and manage for the future.

The book highlights the many urgent problems and policy issues we must face if we want to prevent the demise and collapse of our fishery resources. Fisheries management in the context of integrated coastal management (ICM) is described as a means of solving the management problems facing Philippine coastal resources. Other objectives are to:

- ◆ highlight the crucial role of fisheries in food security in Philippine society;
- ◆ measure the large economic role that fisheries in combination with other coastal resources have in the Philippine economy;
- ◆ show how the stream of benefits from well-managed capture fisheries provides a continuing source of food and livelihood that is basically free to people provided that ecological parameters are honored;
- ◆ illustrate what in aggregate is lost from destruction of fisheries and their habitats;
- ◆ explain why an open-access regime is destroying our fisheries; and support policymakers in the difficult decision to disapprove more intensive exploitation of fisheries versus the need for conservation and management.

This book builds on the gains in coastal resource management (CRM) in the Philippines that focuses on developing the capacity of local government units to implement CRM as a basic service. At the same time, it strongly promotes the need to review and amend national policies that affect the direction of fisheries and ICM. Without new actions and policy directions that reflect the present realities of declining fisheries, the future will indeed be dim for sustainable fisheries and food security in the Philippines! Let us act now!

Chapter 1

The Fisheries Dilemma: Securing Food for Filipinos

“... I want there to be hammerhead sharks and bluefin tuna around when my five-year old son grows up. If present fishing levels persist, these great fish will go the way of the dinosaurs.”⁸

Fisheries are culturally, economically, socially and ecologically important to Filipinos. They contribute significantly to income, employment, foreign exchange earnings, nutrition, and thus to the stability of the Philippines. The sea is a huge food basket that helps maintain the food supply of the whole country and provides livelihood to almost 2 million people.

Philippine fisheries resources, however, are rapidly being depleted, as evidenced by the decline of fish catch around the country. Fish for food is increasingly becoming out of reach of those who need it most. With the lifting of trade barriers across the world, fish products have moved into the immense global market. The icons of export-oriented markets – lobster, groupers and large tunas – are now rarely found in the local markets or in the baskets of fishers; the few that are still caught are snapped up and sold in cities or for export. Meanwhile the icons of food security – scads, sardines and anchovies – have decreased greatly in quantity due to poor or nonexistent management, and their prices have risen sharply. As a result, the people, who depend on the sea as their primary food basket, do so precariously. A large majority has slipped down to the bottom of the economic ladder to become one of the most marginalized sectors in the country.



*Nearshore fisheries support many thousands of coastal dwellers through livelihood and food.
(Photos by S.J. Green)*

The Philippines is at a crossroad of change. Its fisheries policies and directions have changed considerably in the last few decades but, generally, these changes were not supported by appropriate and practical measures and did not benefit the small-scale fishers in particular. The security which fish once provided to buffer the country's national economy and fast-growing population is in serious jeopardy. The diminishing supply of fish, increasing prices and the shift in distribution patterns, both locally and globally, call for re-evaluation of the government's strategies for fisheries development.

To ensure national food security, it is necessary to ensure the country's fish supplies, which means promoting sustainable fisheries for both the small-scale and commercial fishers.¹⁶ Refocusing the policies and programs of the government toward capacitating local government units (LGUs) and law enforcement agencies and redirecting government programs toward sustainable fisheries management through enhanced coastal law enforcement could be a key move toward alleviating poverty and ensuring the food security of coastal dwellers, if not the whole country.²⁷ It would have many positive benefits and could resolve some of the country's major security, economic and social problems in one of its most impoverished sectors.

This book examines more closely the many urgent reasons for government to take the path toward sustainable fisheries and what is needed to get there. Specifically, the succeeding chapters will:

- ◆ summarize the present world and Philippine fisheries situation and how it affects world and Philippine food security;
- ◆ explain overfishing, why it occurs and how it can be detected;
- ◆ explain how the economic benefits of Philippine fisheries are currently being distributed and how this is affecting government's ability to provide food to the most needy sectors; and
- ◆ present a viable framework for fisheries management in the Philippines.

Chapter 2

State of Fisheries and Food Security: Snapshot of a Crisis

“We are in massive denial and continue to bicker over the last shrinking numbers of survivors, employing satellites and sensors to catch the last fish left. We have to understand how close to extinction some of these populations really are.”⁵⁸

A little over one hundred years ago, scientists proclaimed that the food of the sea was “inexhaustible” and that it would be impossible for humans to deplete it. This was probably true then, but in recent times, the ability to fish no longer means you can guarantee food on a daily basis. Times have changed dramatically, and there is now a huge fisheries crisis in the world. This still-growing and creeping crisis is witnessing the collapse of one fishery after another, and the rapid decline of many fisheries around the world.^{34, 58, 66}

THE WORLD SITUATION

Fish, the last commercially hunted species on earth, are rapidly going down the path of all other commercially hunted species – toward depletion, or worse, extinction.^{58, 79} In 1950, no marine fish stocks were known to be overfished. Up until 20 or so years ago, as scientists had predicted in the last century, fish catch seemed to be ever increasing. From the 1940s to the late 1980s, the wild catch of marine fish rose steadily (Figure 1).⁸⁶

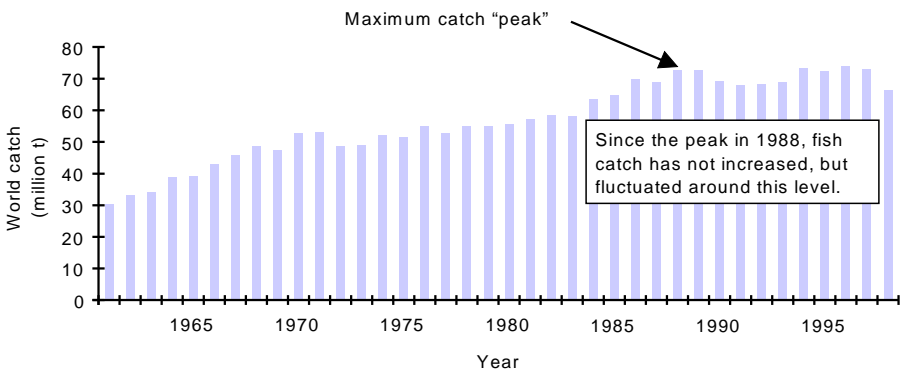


Figure 1. World marine fish catch per year.³²

The rapid growth of the fishing industry coincided with the rapid advances in fishing technology. New artificial fibers made cheaper and stronger nets, new and modified fishing gears evolved to increase efficiency, and electronic sonar and navigation equipment were developed, along with power blocks and other mechanized systems designed to increase fish catch. These developments, alongside improved fish port and canning facilities, all translated to faster delivery of fishery products to a wider market, while ensuring a longer shelf-life for these products.^{57, 80}

The fisheries boom which came with this rapid growth did not last, however. Despite increased investments, by the 1970s, some marine species were found to be on the brink of collapse. Eventually, the capture of species believed as endangered was prohibited internationally. Since then, some species have recovered but, despite a total ban on their capture, certain species of whales, sea otters and other marine species have disappeared completely, such as the Atlantic cod fishery.^{40, 44}

Grand Banks fisheries: Point of no return?⁴⁴

When explorers arrived at Grand Banks in Newfoundland, Canada, in 1500, they reported finding a fishery so rich they could simply haul fish out of the sea in wooden baskets, with no need for hooks or nets. In 1981, the fishery brought in 779,000 tons (t) of fish composed mainly of one demersal species, cod, worth some US\$705 million. At the time, East Coast Canada had 29,000 registered fishing vessels and over 1,000 processing plants. The fishery provided jobs to more than 62,000 people; all told, fisheries employed 20% of Newfoundland's workforce.

However, decades of overfishing and the unsustainably large commercial fishing industry soon caused the fishery to collapse. In 1992, the fishery was forced to shut down for most commercially exploited species, and strict limits had to be imposed on other species. Fishers and all other people who depended on the fishery had to leave the business, because there simply were no more fish left to harvest.

The fishery has still not recovered, even as the ban on cod fishing continues to be strictly enforced, and only limited harvesting of other species is allowed. Losses to fisheries in the region are placed at about US\$50 million a year, affecting more than 50,000 people.

Meanwhile, fisheries continue to develop worldwide, targeting more species through larger investments in fishing technology (Figure 2). After depleting one stock, the boats just move onto another species or fishing ground or into other countries' exclusive economic zones (EEZ) under the guise of trade and international development. In the productive waters off northwest Africa, foreign fleets from industrialized countries now take over six times as much fish as the local fishers.⁴⁷

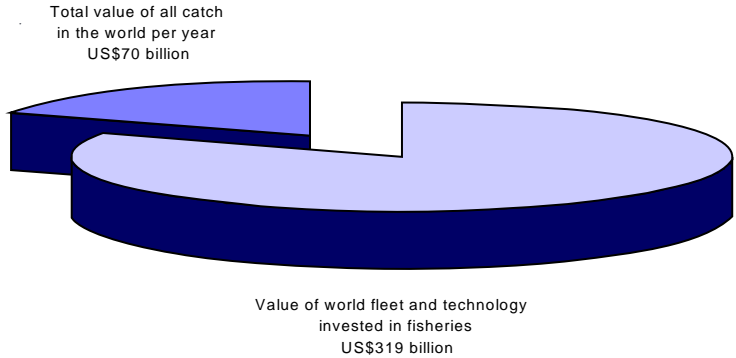


Figure 2. Overinvestment in fishing technology.⁴⁰

In 1989, commercial fishing fleets and small fishers together harvested some 89 million t of marine fish worldwide, but since then, despite continued investment in new fishing gears, new and bigger boats and other technologies, world fish catch has not increased (Figures 1 and 2). Between 1970 and 1995, while the size of the world fishing fleet expanded by more than 400%, fish catch increased by only about 30% (Table 1).

Table 1. Changes in world fishing boat tonnage compared to fish catch.²⁹	1970	1980	1990	1995
Gross tonnage (million t)	10	22	38	43
World marine fish catch (million t)	52	58	68	69
% increase of tonnage of boats	-	120	73	13
% increase of catch	-	12	17	1

In 1994, the United Nations Food and Agriculture Organization (FAO) estimated that about 74% of the world's major fisheries had been fully exploited, overexploited or depleted (Figure 3).³² Adding to the problem, systematic distortions in world fisheries catch have recently been revealed that exaggerate actual catch from individual countries.⁷⁸ Today, once abundant populations of Atlantic cod, haddock, king crab, blue fin tuna, lobster, grouper, bumphead wrasse — the list goes on for demersal and pelagic fish, crustaceans and other marine organisms — are all overfished or depleted.⁸⁶ The World Conservation Union lists 1,081 fish worldwide as threatened or endangered.⁷⁰

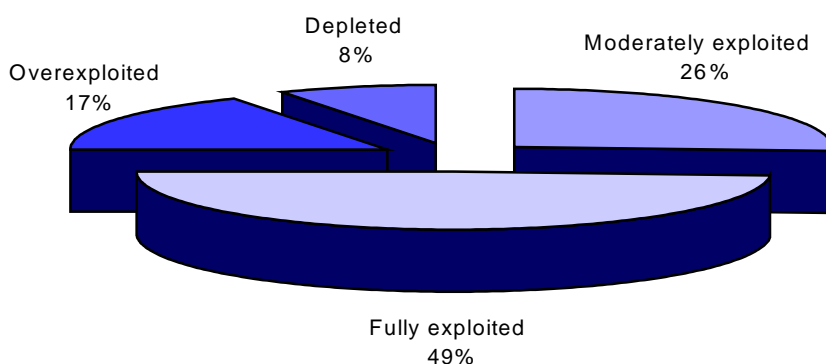


Figure 3. Level of exploitation of world's major fisheries.³²

THE PHILIPPINE SITUATION

Fisheries decline also exists in the Philippines. Although recognized the world over for its outstanding and productive marine ecosystem, the country is suffering from the same maladies besetting other fishing nations.

As an archipelagic state with over 2.2 million km² of highly productive seas, the Philippines is fortunate to have vast fishery resources at its disposal.¹¹ In this context, it is not surprising that fisheries have been developed into a major economic sector.

The Philippines was the 12th largest producer of fish in the world in 1998, ranking higher than Thailand, Malaysia, Indonesia and Taiwan.³⁷ In 1994, it ranked 14th among the world's

industrialized fishing fleets. The contribution of fisheries to the country's gross domestic product (GDP) was about 2.3%, valued at more than P76 billion (18.8% of the total agriculture sector), more than the contributions of livestock, poultry and forestry.¹¹ The combined catch of commercial and municipal fisheries was estimated at 1.74 million t, valued at more than P65 billion.¹¹ All told, the total annual national economic benefits derived from coral reefs, fisheries and mangroves in the Philippines were estimated to be in the order of P140.56 billion (US\$3.5 billion) in 1996.⁸²

A multitude of stakeholders depend on fisheries, including municipal and commercial fishers, canneries, fish markets and various industries. Fish provides direct income to some 1.3 million small fishers and their families.⁴³ This generates an average earning of P4,000 per household per month or over P62 billion worth of employment every year. Indeed, many rural Filipinos still regard the sea – traditionally considered as the “employer of last resort” – as a place where any family could move for a secure life.

All of the Philippines' main fish species and marine organisms, however, are showing severe signs of overfishing. Despite the continued expansion of the country's commercial fishing fleet, total fish catch leveled off at around 1.65 million t in the early 1990s.⁷ Indeed, as early as the late 1960s, the country had reached the maximum economic yield of its demersal fish stocks (bottom-dwelling species, such as groupers and snappers), except in the offshore hard bottoms around Palawan, Southern Sulu Sea and central part of the country's Pacific coast.⁷² Studies on Philippine small pelagic fisheries (midwater dwelling species, such as scads and sardines) also indicate overfishing and declining catch per unit effort (CPUE) (Figure 4). Exceptions are in lightly fished areas in waters off Palawan, parts of the country's Pacific coast and some parts of Mindanao (Figure 5).⁷ Such finding is supported by an observed change in species composition, i.e., anchovies have partially replaced sardines, scads and mackerels in the catch, an indication of gradual stock collapse.⁸²

Lingayen Gulf, a major fishing ground in northern Luzon, Philippines, reached its maximum sustainable yield (MSY) more

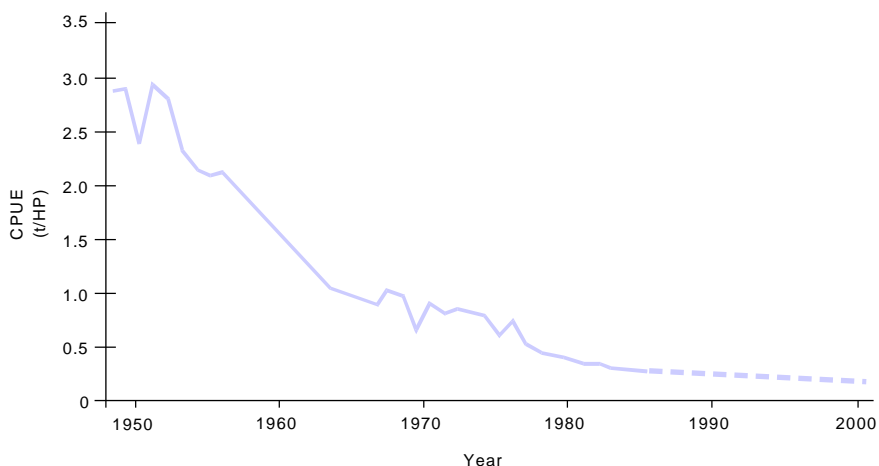


Figure 4. Trend of catch per unit effort (CPUE) (t/HP) for municipal small pelagic fisheries in the Philippines since 1948.^{10, 19, 20, 21}

than 20 years ago (Figure 6). The fishery now has 400% too much effort for the available fish stocks. Catch rates in the gulf are five times smaller than they were 15 years ago, compelling fishers to invest more time and money in dwindling catches.^{46, 88}

Research conducted by the WorldFish Center in 1998-2001 found that, overall, “the level of fishing in the grossly modified stock (in the Philippines) is 30% higher than it should be (i.e., fish are being harvested at a level 30% more than they are capable of producing).” This excess fishing is resulting in economic losses conservatively estimated at about P6.25 billion (US\$125 million) per year in lost fish catch.⁴⁸ What constitutes fisheries health is noted below.

Measuring fisheries health

Fish catch, as displayed in statistics and production figures, reflects an amount of overall catch, but it does not take into account the relative health of fish stocks. A much better indicator of the health or overall balance of fish stocks would be the variety and size of the fish caught.

CPUE is a tool that can show the catch of fish or fishery for a given fishing gear and level of effort over time that fishing gear is applied. This gives an overall picture of the status of the fishery over time but it may not reveal changes in catch composition or value of catch.

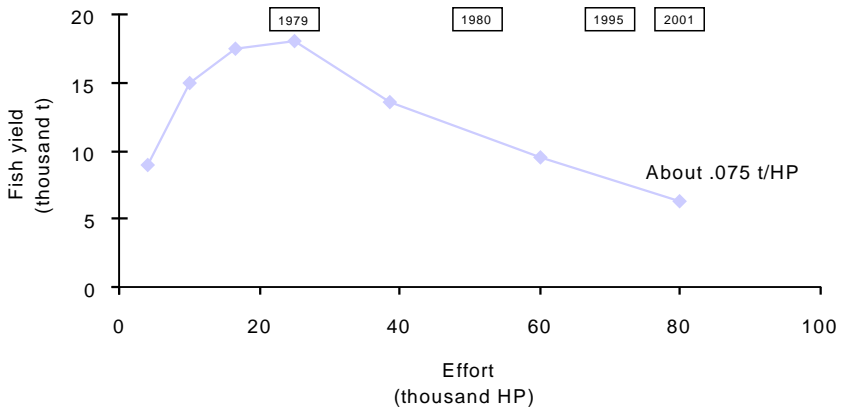


Figure 6. Total fish yield in Lingayen Gulf compared to fishing effort.⁴⁶

Analyses of CPUE in six coastal provinces in the Philippines for the common hook-and-line type of fishing reveal alarming results: that fish catch is in some cases less than 5% of the original levels of only a few decades ago (Figure 7).

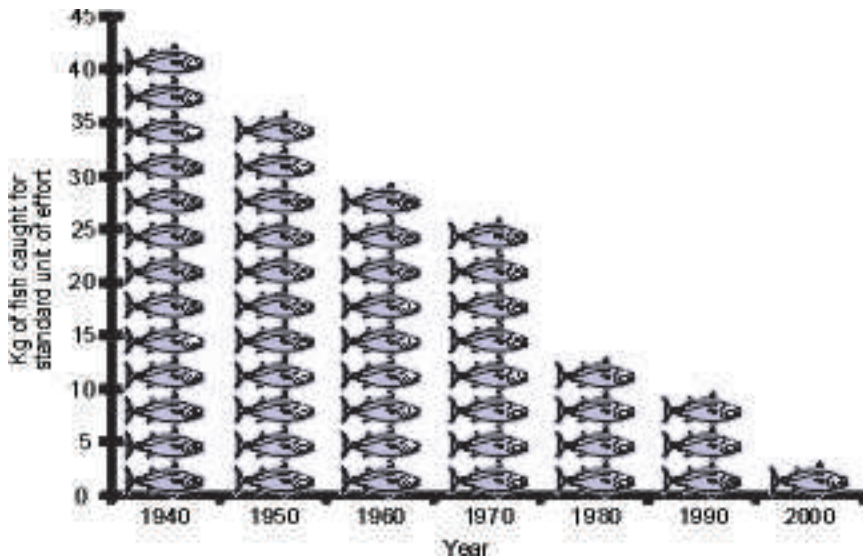


Figure 7. Average CPUE since 1940s for fishers using hook-and-line from six provinces in the Philippines.^{6, 24, 41, 74, 77, 87}

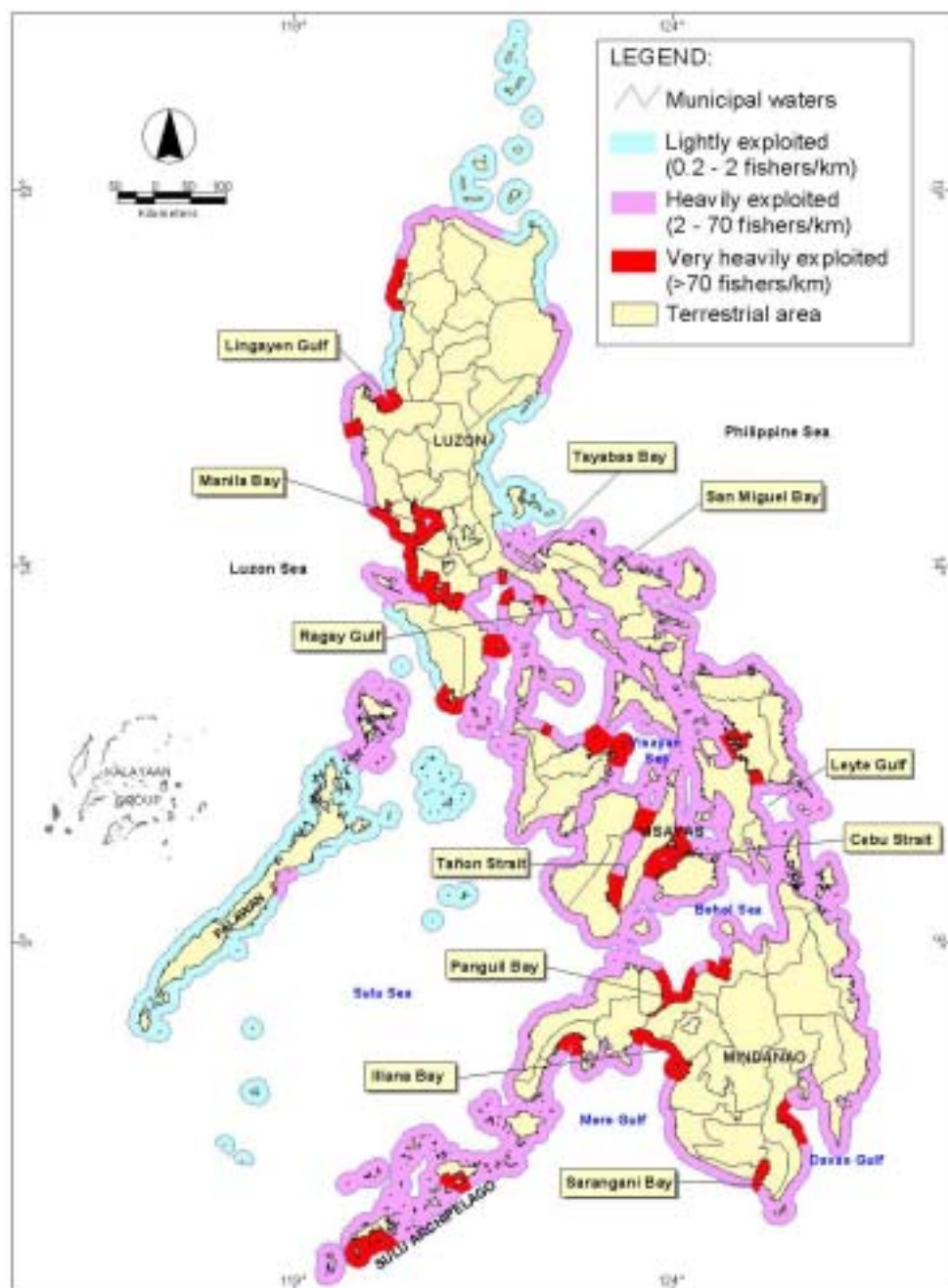


Figure 5. Map of heavily exploited areas in the Philippines.⁷⁵

FISH AS FOOD: A DIRE FUTURE

Why are fisheries overfished or depleted? Worldwide, the following reasons are commonly cited:^{32, 40}

- ◆ open access nature of fishing (lack of management, regulation, enforcement);
- ◆ widespread technological advances (more efficient gear; stronger and larger nets; electronic fishing devices like sonar; increased ability to fish all over the world, even in the most isolated places);
- ◆ economic development policies of governments, especially those providing subsidies to keep inefficient boats running and encouraging even more investment in fishing technology and boats;
- ◆ growing human population; and
- ◆ large increase in prices of fish for a growing global market.

If not addressed, these issues will have major repercussions on fish supplies worldwide and will decrease the world's food security.

Fish is the world's fifth largest agricultural resource and accounts for 7.5% of total world food production.⁴⁷ It supplies approximately 6% of the world's protein and 16% of its total animal protein.³⁰ As a source of food, it is indispensable, as other natural animal or vegetable protein sources are poor substitutes on both nutritional and economic grounds. Fish provides a highly nutritious diet of protein; essential fatty acids; vitamins A, B-1, B-2, B-12 and D; as well as minerals, such as calcium, phosphorus, magnesium and iron; and trace elements and micronutrients like



A.E. Sia

People all over the Philippines enjoy eating fish — a traditional and healthy food.

iodine and zinc.⁵⁵ It has also been shown to have a variety of health benefits, including prevention of coronary heart disease in many individuals.⁷⁶

Historically, fish resources were caught for domestic consumption alone. Today, with as much as 35-40% of the global harvest being traded internationally, they have become one of the world's most highly traded natural resources, accounting for over US\$50 billion in international trade.^{31, 55} The Asian and Pacific region is the main producer and consumer of world fish supplies.

Vital to poor people, marine capture fisheries contribute significantly to world food security by providing livelihood and large amounts of nutritious protein to fishers and their families. More than 1 billion people around the world (approximately one-sixth of the global population) depend on fish as their primary source of animal protein, and fisheries and related industries provide livelihood for up to 400 million people worldwide.³¹ In Southeast Asia alone, more than 5 million people fish on a full-time basis.¹



Fishing employs millions of people worldwide with a higher percentage in coastal countries like the Philippines. (Photos by S.J. Green)

In developing countries, where fish is a particularly important part of the diet and subsistence fishers still make up a sizable portion of the populace, the potential human costs of the current decline in fisheries are huge. The prices of most fish species continue to rise as harvests shrink, making fish a less affordable meal among low-income populations. Meanwhile, continued

overfishing of coastal waters by subsistence fishers, aggravated by competition with larger mechanized fishing vessels, is leading to a cycle of smaller catches and increasing damage to the resource base.⁸⁶

In the Philippines, critical issues affecting fisheries are:

- ◆ open access;
- ◆ overfishing and excessive fishing pressure;
- ◆ lack of management;
- ◆ inappropriate exploitation patterns;
- ◆ post-harvest losses;
- ◆ small and large-scale fisheries conflicts;
- ◆ habitat degradation;
- ◆ lack of research and information; and
- ◆ inadequacy of technical/human resource capabilities particularly among managers and concerned agencies to analyze fisheries.

Although national consumption per capita of fish dropped from 40 kg per capita in 1987³⁵ to 24 kg in 1996 (Figure 8)⁹, fish remains a major component of the diet, accounting for over 50% of the total animal protein consumed in the country.¹ With population increasing by 2.36% annually⁵⁹

and marine capture fisheries remaining stagnant, the future does not look good for the food security of the country, especially its lower-income families. By some experts' estimates, if no appropriate action is taken to reverse declining fish production



S.J. Green

Catches of very small and often immature fish are a major contributor to overfishing.

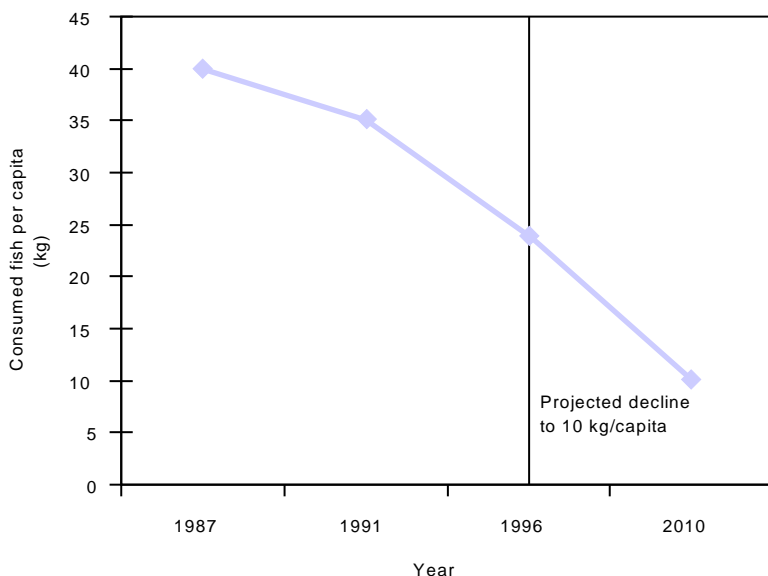


Figure 8. Per capita fisheries-related food available for consumption in the Philippines (1987-1996).^{9, 10}

S.J. Green



Cultured fish such as Tilapia are increasing in quantity but only contribute a small proportion of the fish consumed in the Philippines.

trends, only around 10 kg of fish will be available annually for each Filipino by 2010 (Figure 8).

Warns Garry Leape, Legislative Director for ocean issues at Greenpeace, "We've reached a point where we have the technology to catch the last fish" (Figure 9).⁴⁰ Indeed, as

fishery expert Daniel Pauly puts it, "At the current rate of exploitation, many stocks could be eliminated within 25 years, we may well end up with a sea of jelly fish".⁶⁵

The FAO predicted in 1995, “If it is assumed, under the most pessimistic assumption regarding future supply, that governments and resource users take no action to reverse the disastrous level of overfishing and degradation of coastal environments, the supply of fish for direct human consumption from marine capture fisheries could fall to 40 million metric tons in 2010, certain stocks would be likely to collapse”.³³

There is no easy way out: The way we think about and manage fisheries needs to undergo major changes if we want to maintain even the current levels of catch, let alone increase it further as implied in Figure 9.

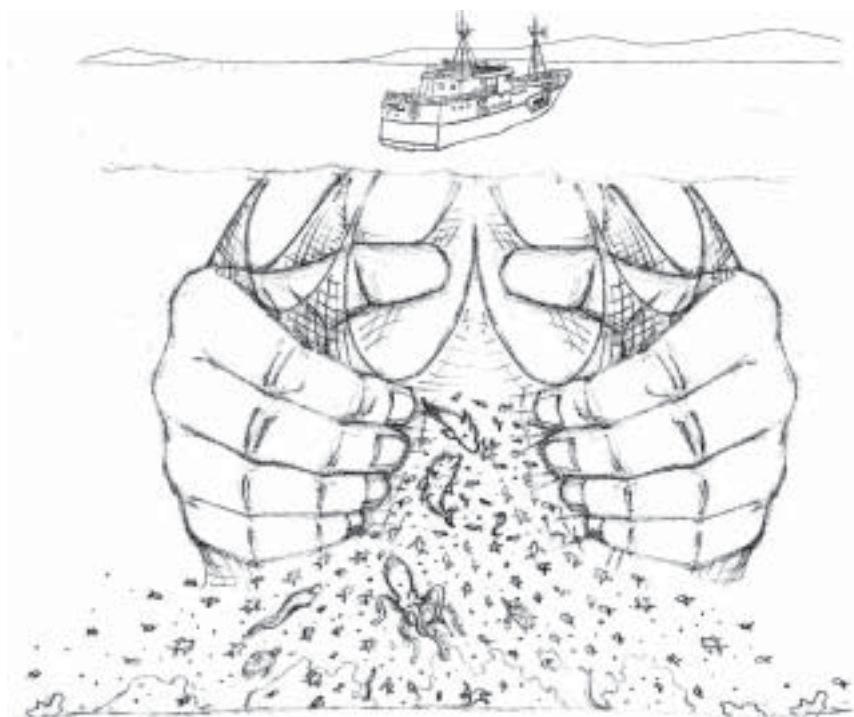


Figure 9. *Current technologies give us the ability to catch everything in the sea.*

Chapter 3

Pathology of Overfishing: The Biology Factor

"... we estimate that large predatory fish biomass today is only about 10 percent of pre-industrial levels. We conclude that declines of large predators in coastal regions have extended throughout the global ocean, with potentially serious consequences for ecosystems."⁸

People have always treated the sea as if it were an endless resource. Worse, not only have we taken huge volumes of fish, we do it in ways that destroy habitats or make it impossible for the resource to renew itself. All over the world, trawls are plowing up and destroying the seabed; fine-mesh nets are catching fish before they become mature and able to reproduce; fish are being caught during their spawning migrations and aggregations; and rubbish are thrown and untreated wastewaters are released into the sea.

In the Philippines, up to 75% of coral reefs are degraded.^{3,}
^{39, 83} Mangroves, another vital fisheries ecosystem, have shrunk from 450,000 ha in 1918 to less than 138,000 ha in 1994.^{26, 82} The biological limits of fisheries were reached well over a decade ago.

To begin to address our fisheries problem, it is vital for people to accept that fish is a biologically renewable resource with biological limits, and can easily be exhausted. The key to solving the fisheries crisis is to understand the nature of overfishing and its causes.



A.T. White

Healthy reefs can support annual fish yields of 20 t/km² or more.

ANALYZING OVERFISHING

The sea is not a machine, which gives out food upon request; it is a living resource composed of many individual living

units. Because fish are living organisms, they have certain limits within which they can thrive. Rarely will a fish stock be totally fished to the last individual, but a limit called “minimum viable population” is required for fish to be able to breed a sizeable number of young to replenish its population. Going beyond this limit has implications for the fish stocks as a whole. Ideally, one would want to achieve the highest fish catch level that leaves sufficient fish in the sea to breed. This is known as the maximum sustainable yield (MSY).

For a well-managed fishery there needs to be at least one-third to two-thirds of all the types of fish left over each year to spawn, reproduce and produce enough juveniles for the next year. To function properly, the marine ecosystem requires a mix of fish of various species, sizes and age. These complex natural and biological parameters set limits on the capacity of a fishery resource to replenish itself.

Overfishing is reached when the amount of fishing effort is beyond the biological limits of a certain resource. It is the point when fish catch exceeds the MSY and begins to drop for all fishers, and the number of fish drops to a level lower than required for maintaining a viable and productive fish population.

Overfishing in the Philippines and many other fishing nations results from a variety of causes, all of them rooted in the *de facto* “open access regime” that prevails in marine capture fisheries.

A.T. White



In open-access fisheries, the resource is open for everyone to use, with each fisher deciding on where to fish, when to fish, how many hours to fish, what fish to take and what gear to apply.²⁷ The following are some of the immediate causes of overfishing.^{62, 63}

Unrestricted open-access often leads to severe overuse and crowding as shown by too many fish traps in a bay.

Growth Overfishing

Fish are caught below the size or age required for reproduction, resulting in growth overfishing (Figure 10). Some countries ban the landing of fish below certain sizes and, in certain cases, require that females of different species are returned if they are taken close to the spawning season (Figure 11). For example, Australia, which has relatively well-managed fisheries, not only bans the capture of fish of minimum sizes, but also of maximum sizes. If a fish is caught larger than a certain size, then it has to be returned. This regulation is supported by a very basic biological principle, that fish reproduce more as they age. Fish fecundity increases with increase in fish size – exponentially. In terms of productivity, older fish are much more valuable than younger fish because, in general, younger, smaller fish produce fewer numbers of eggs (Figures 12 and 13). An example is the snapper *Lutjanus campechanus*. It takes 212 female individuals of this species measuring 42 cm to produce the quantity of eggs that one 61 cm female of the same species can produce.¹⁴ In other words, a 33% increase in fish size increases 212 times the number of eggs produced by the individual.

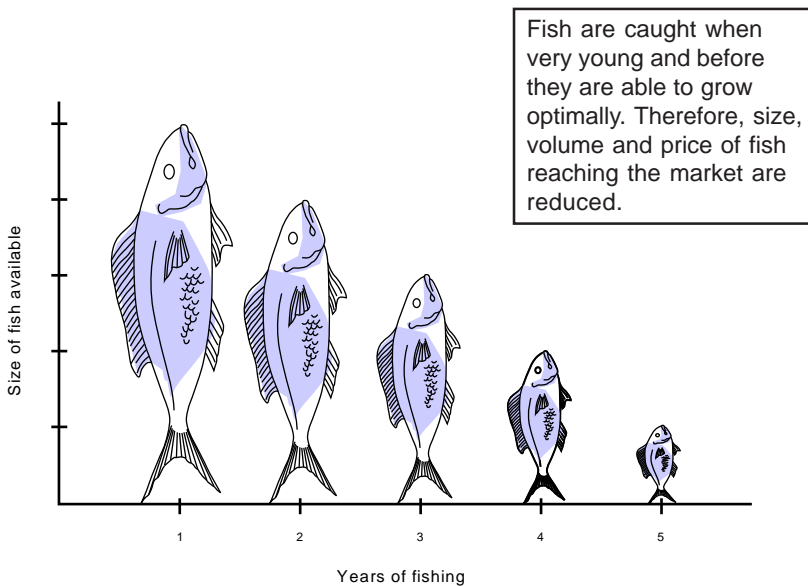


Figure 10. Growth overfishing.

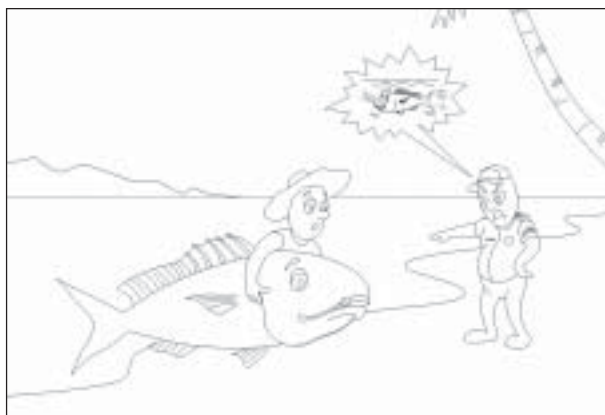


Figure 11. *In some countries, large mature fish cannot be caught.*

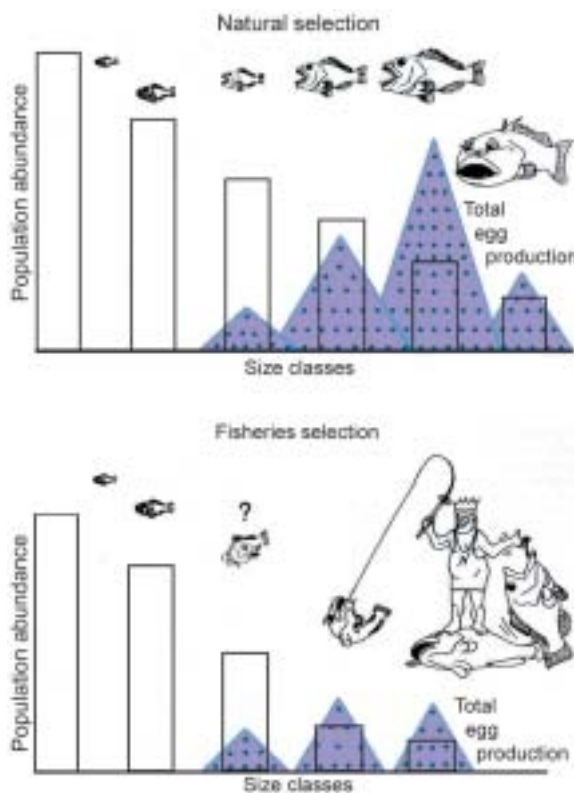


Figure 12. *Effects of natural versus fishing mortality on population size structure and total egg production from coral reef fishes.¹³*

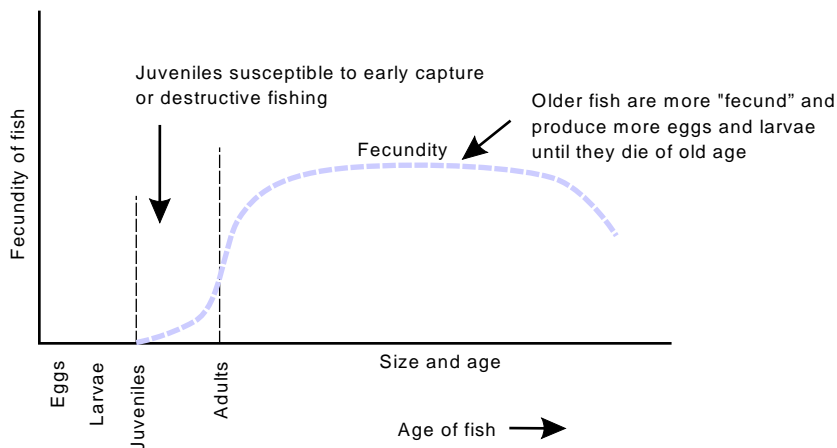
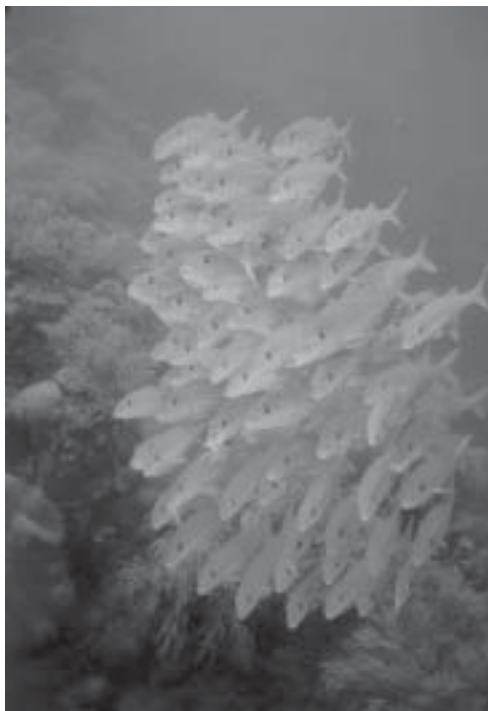


Figure 13. How fish species reproduction is affected by fishing influences and age.¹⁵

Easy catch. Pelagic fish tend to aggregate together because, under the survival instinct, it is safer for them to travel in numbers. Even in the presence of a big group of predators, by their sheer number, the individual fish have a greater chance of survival and, by being in a shoal, they can more easily spot a predator (a thousand eyes are better than one). However, with the advent of industrial fishing, such tendency has also led to their downfall, because it makes their capture very easy. Unlike their natural predators, large ringnets and purse seines can catch a whole school of fish before it is able to move or escape, making the stock vulnerable to overfishing.



L. Funkhouser

The natural schooling tendency of fish makes them highly vulnerable to capture in nets.

Recruitment Overfishing

Fish are caught before they can optimally reproduce, leading to recruitment overfishing. This occurs when the adult population is caught in very large numbers, such that reproduction is impaired. In a fishery showing recruitment overfishing, the majority of certain species caught are juvenile, as most of the adult fish have already been caught. For example, in the heavily exploited fishing grounds of Lingayen Gulf, Manila Bay and Samar Sea, far more adult fish are killed by fishing than by natural causes, making fishing the dominant factor in the evolutionary process of natural selection. This has resulted in populations evolving to be faster growing and earlier maturing fish with a shorter life and smaller – and therefore less productive – adult size, leading to the eventual depletion of the stock.⁶⁵ Worldwide, fish sizes are getting smaller and this is having a huge impact on the reproduction capacity of the fish involved (Figure 14).

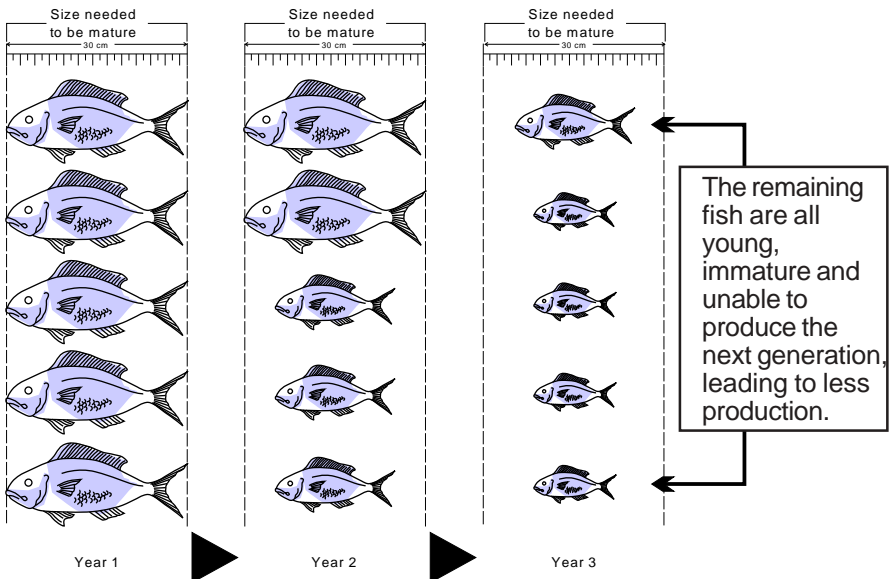
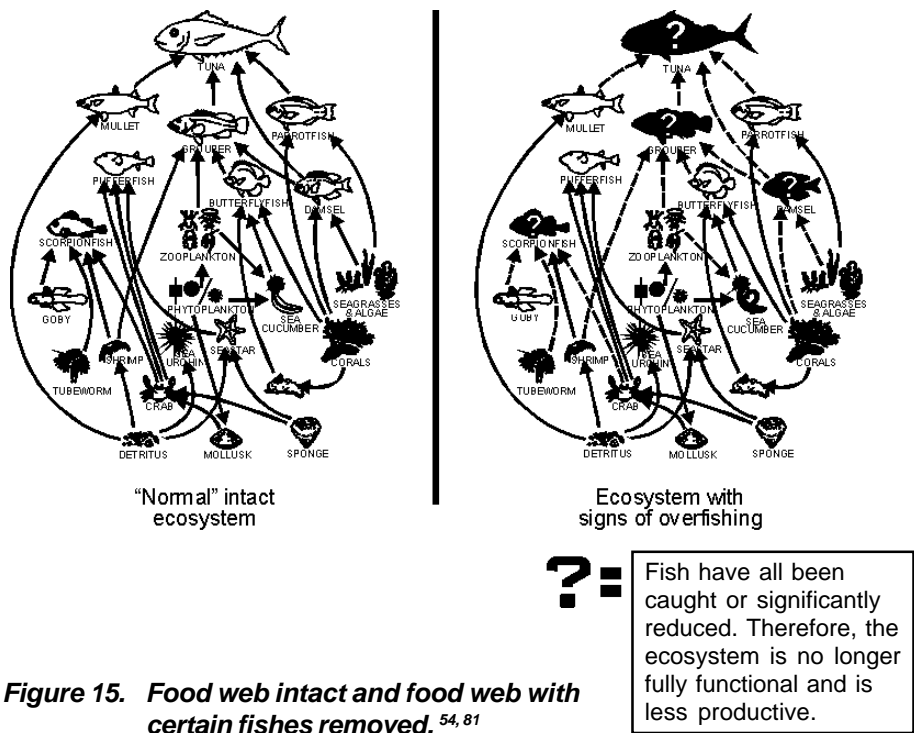


Figure 14. Recruitment overfishing.

Ecosystem Overfishing

Excessive fishing results in an ecological imbalance and eventual changes in the fishery, causing ecosystem overfishing.²³ Fish invertebrate and marine plants are linked to each other in an intricate food web. Some species feed on another, and the energy goes into producing the surplus fish we take through fishing. When one species disappears from the food web, others may replace it, thereby changing the whole system through an “ecosystem shift” that affects other marine organisms.⁵⁴ The loss of large numbers of one population has a profound impact on the whole ecosystem, disturbing its intricate balance, thus changing its composition and even population structure (Figure 15). An example of ecosystem overfishing leading to changes in fishery is the overfishing on many coral reefs in the Philippines, resulting in almost total disappearance of some predators such as sharks and large groupers. In many cases, the food chain has been disrupted (Figure 15). Such an imbalance makes the ecosystem no longer fully functional and less productive.





Sharks are being harvested in large numbers as seen in one off-loading from a foreign vessel in Davao Port.

In recent years, there has been a clear shift in the types of fish caught around the world. This is because many traditional commercially targeted stocks of larger, slower growing species have declined. Because the larger carnivores have become rare, fishers are compelled to turn to the more mobile shoals of small pelagic fish or other species, so that once minor

stocks are becoming the major ones. This continues cyclically until eventually the top portions of food webs are depleted.^{64, 65}

After large carnivores – the top predators – are targeted and depleted, smaller fish follow, and so on in a downward spiral through the food web. Large-scale changes have taken place in such fish stocks, creating dramatic fluctuations as certain species are removed, and as predators, prey and other species modify their behavior to fill gaps in the food web. As a result, fisheries look very different today than they did even a few decades ago.⁵⁸



Seabirds are part of the food web that depend on fish for food.

The depletion of certain fish stocks has even affected other marine mammals and seabirds that are part of the same food web. Steller sea lions in the North Pacific are now a threatened species as their numbers have declined from 300,000 in 1960 to less than 66,000 individuals. Three-quarters of the world's population of stellers live in Alaskan waters where pollock, their main prey, is heavily overfished.⁴⁰ In the Philippines, sharks have almost totally disappeared from inshore waters due to overfishing at the top of the food web.

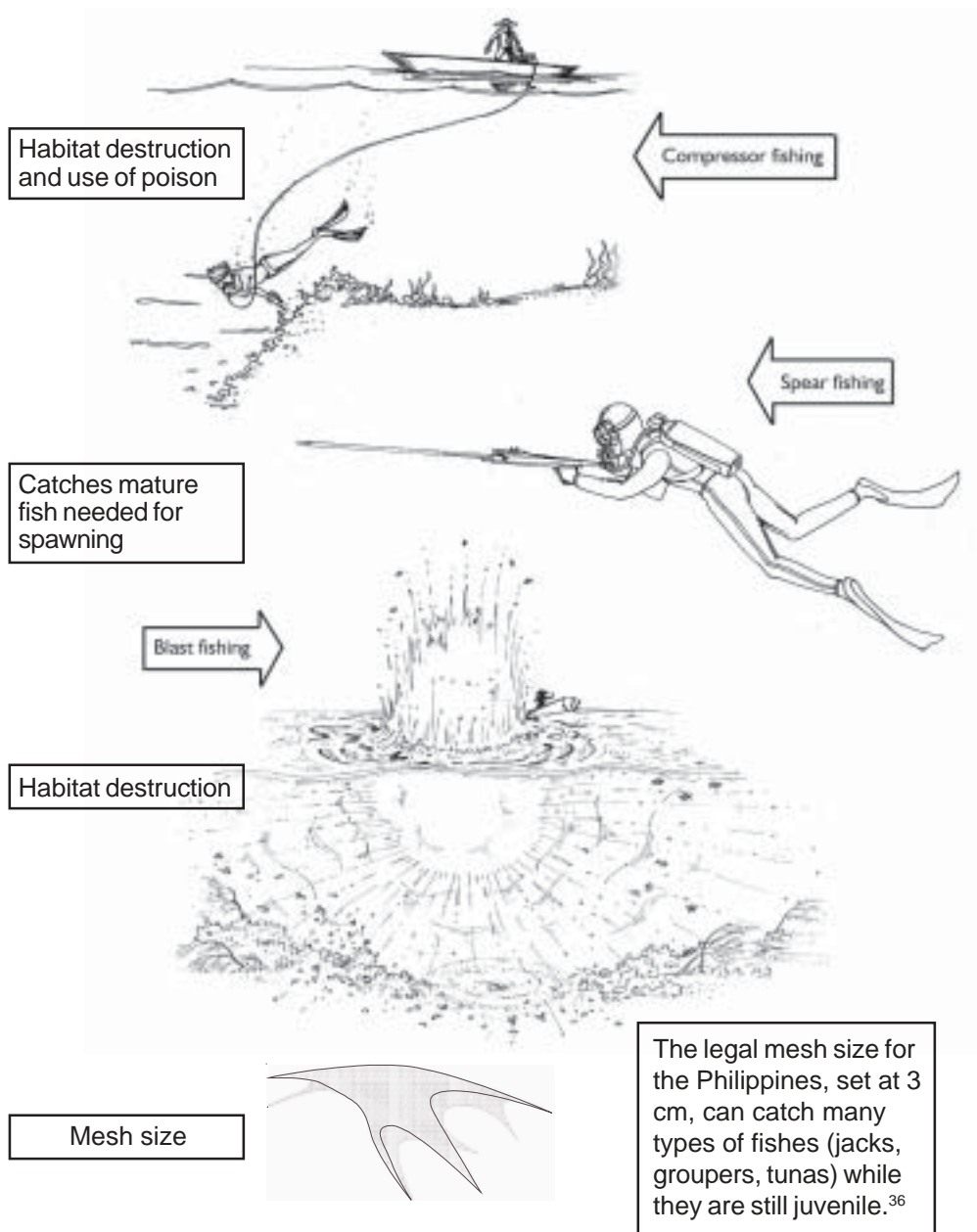


Figure 16. Common fishing gears banned (nationally or locally) in the Philippines and the potential damage they cause.⁷³

Malthusian Overfishing

Fishers, getting little or no catch and believing they have little choice left, use illegal and destructive fishing gear to improve their catch. Malthusian overfishing manifests itself when the fisheries are in such a poor state that they cannot provide enough fish for all the people who depend on them.⁶¹ The use of destructive fishing gear provides income in the short term, but because it affects ecological processes by destroying habitats, it makes the situation worse over the long term (Figure 16).

Economic Overfishing

When investments in fisheries are made purely from the point of view of business, based on the false assumption that fish catch will increase infinitely with fishing power, economic overfishing results. Here, the fishery is overinvested, has limited returns, and overall is unprofitable for all concerned. The fishing business as a whole will always run at a loss, but because the returns are not evenly distributed, some are affected more than others. A sure sign that economic overfishing is happening is when the total economic value of all the fishing paraphernalia and equipment exceeds the maximum fish catch that the fishery can sustain (Figure 17).

Costly business. The industrial fleet of 38,000 fishing vessels (over 24 m), which number only 1% of the total 3.5 million fishing vessels in the world, actually represents 72% of all capital invested in the entire global marine fishing fleet, or about US\$229 billion. These vessels also consume a disproportionate amount of fuel – over 20 million t of fuel per year – or 44% of all fuel consumed by fishing vessels worldwide.⁴⁰

The world's fishing fleets now have a combined worth of about US\$319 billion, yet the combined value of the marine fish catch is only US\$70 billion annually (Figure 2).³² That some fleets are still existing at all is largely due to the huge subsidies given to them to literally keep them afloat. These subsidies come in a variety of forms, including cheap access to credit, inflated prices for

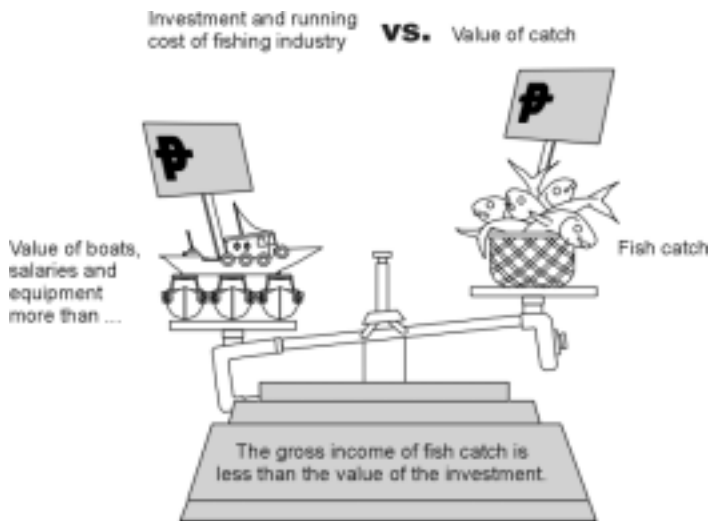


Figure 17. Economic overfishing occurs when the value of fish catch is less than investment in the fishing industry.⁴

fish products, capital and infrastructure programs, tax breaks, trade agreements and price support programs. Currently, subsidies amount to US\$124 billion for the commercial fleets of developed nations to catch US\$70 billion worth of fish per year.⁸⁵

DETECTING OVERFISHING (FROM SHIFTING BASELINES)

Scientists are now discovering that fisheries have changed more than we are aware of, and that human activities have altered the sea dramatically over the last few centuries. Furthermore, they have found that fishing has had such a strong effect on the oceans for so long and in so many cases, that it is now very difficult to imagine how full of life oceans once were.^{51, 66} Pauly calls this phenomenon “shifting baselines”. The baselines we are using now to assess the productivity of the sea are really only relative to our time reference, to that space in time for which we have the anecdotal and scientific evidence. For example, if we compare the sea that we have now to the sea of 50 years ago, we can conclude that, most of our fish stocks were still intact and that, back then, our sea was “healthy” (Figure 18). We must remember, however, that our

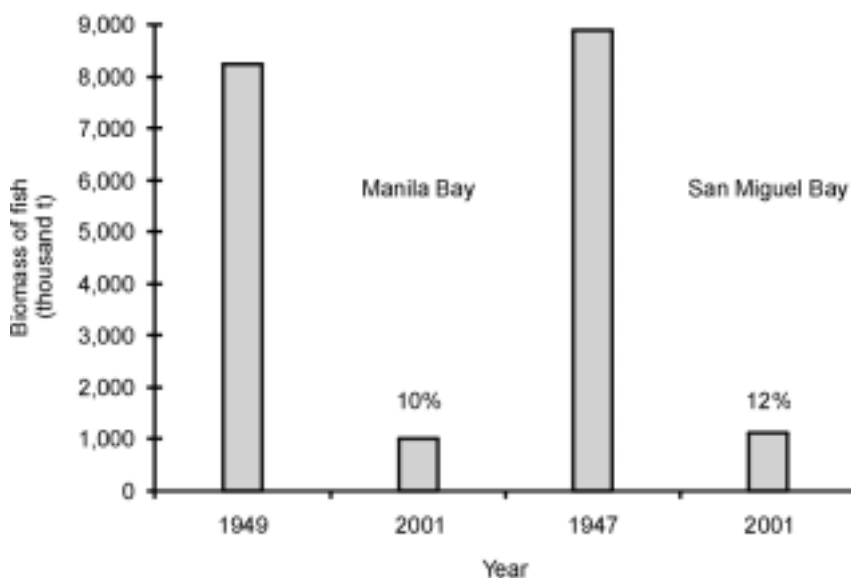


Figure 18. *A change in biomass over time of two major fisheries of the Philippines illustrates a “shifting baseline” (biological mass, i.e., the volume of the large predatory fish and other marine organisms).⁴⁹*

data from 50 years ago may have changed dramatically from what they were 50 years or a century before – the baseline had shifted over time – and therefore what we regard today as a “healthy” fish population based on the 1950s figures is in fact already significantly changed from the actual baseline.^{58, 66}

Even now, it is not easy to pinpoint the exact time when overfishing begins. In a country like the Philippines that has a multispecies tropical fish stock and fishers using many different types of fishing gear, it is particularly difficult to determine what is happening to a fishery at a specific time. Nevertheless, fishing down the biomass in several Philippine bays is well documented (Figure 18).

In the absence of good hard statistics, long-term fish stock assessments and CPUE data, there is a need for managers and resource users to have a framework upon which to rapidly assess their fisheries.⁵² The following are common indicators that managers can use to detect overfishing:²⁷

- ◆ increased catch and sale of juvenile (immature) and lower-value fish;
- ◆ catch composition noticeably changed, with marked decrease in size and



L. Funkhouser

Decreasing numbers of large marine animals, such as manta rays, is a sign of overfishing.

- abundance of high-value and once abundant fish (e.g., *lapu lapu*), or disappearance of once abundant marine species such as sharks, turtles, *dugong*, large shells and certain species of fish;
- ◆ increased use of fine-mesh nets to catch fish (e.g., triple-net, double-net and even mosquito net!);
- ◆ fishers spending more hours to catch fish or unable to fish all year round;
- ◆ marked drop in fishers' incomes;
- ◆ marked increase in illegal fishing and use of destructive fishing methods;
- ◆ increasing conflicts between municipal and commercial fishers;
- ◆ proliferation of fish aggregating devices, such as *payaos*;
- ◆ intrusion of commercial fishing boats into municipal waters;
- ◆ large increases in the price of first and second-class fish;
- ◆ increasing number of fishers traveling to distant fishing grounds (even to other countries) to catch fish they used to be able to catch locally; and
- ◆ fish traps proliferating along mangroves and rivers.

Although it is not easy to assert with hard scientific evidence the status of all fish stocks at all times, scientists are now able to put together a variety of information to determine trends and relative conditions of most fish stocks.⁵² This analysis, using a



Increasing number of fish aggregating devices (payaos) is one sign of overfishing.

variety of techniques noted in this chapter, leads to the conclusion that the fisheries today are drastically different from those of 50, 100 or more years ago. Our point of reference (baseline) has shifted, generally to our detriment. We now need to stabilize our “baseline” before we

can substantially improve fishery reproduction and production in this 21st century.⁶⁵

Our immediate actions could focus on practical efforts to detect the causes of overfishing. This is similar to how a physician detects his patient’s ailment. The causes of overfishing individually or in combination can be likened to the symptoms of the ailment. We know the need for a comprehensive solution or cure in this case, but focusing our efforts on individual causes or symptoms will only begin to alleviate the situation.

Chapter 4

Economics and Equity of Philippine Fisheries

“If stocks were restored to higher abundance, we could get just as much fish out of the ocean by putting in only 1/3 to 1/10 the effort. It would be difficult for fishermen initially – but they will see the gain in the long run.”⁸

The problem facing Philippine fisheries today is not just one of resource decline; it is also, perhaps more dauntingly, an issue about social equity, which is at the core of the ongoing debate on where we want fisheries to go in the near future. Fish is an important factor in the Philippine food security equation, and not only as a vital source of animal protein. In a country where marine capture fishing is the sole means of livelihood for a significant part of the population, food security is inevitably equated to the health and sustainability of the sea. The health of the sea and its resources will determine its ability to continue supporting the millions of fishers and their families who depend on it directly for income and sustenance.

FISH-RICH, FOOD-POOR

Various socioeconomic data indicate that the ability of the sea to provide a cheap source of food and income for the Filipino masses has been severely

compromised. The Philippines – one of the world’s 40 largest fish-producing nations – is also among the 10 low-income, food-deficit countries of the world. These countries account for a third of the world’s fish production, as much as 28% of the value of fish exports



A.T. White

Poor coastal dwellers depend directly on food and income from the sea.

and 14% of the production of global fish exports, yet have about three-quarters of the world's malnourished preschool children.⁵⁵ In 1997, the National Research and Development Extension Agenda and Program estimated that the Philippines had a national nutritional deficit of 666,140 t of food.³⁷

Who then reaps the benefits of the country's fisheries?

Philippine fish production by sector in 2000 was approximately 793,824 t for municipal fisheries using boats smaller than 3 GT, and 946,485 t for commercial fisheries (3 GT and above). Commercial fisheries catch by value was P33.9 billion, while municipal fisheries catch amounted to P32.5 billion.¹¹ Overall, production data appear heavily skewed in favor of commercial fisheries. Between 1991 and 1996, while Philippine fisheries production was static overall, the contribution of commercial fisheries increased while that of municipal fisheries shrank (Figure 19).

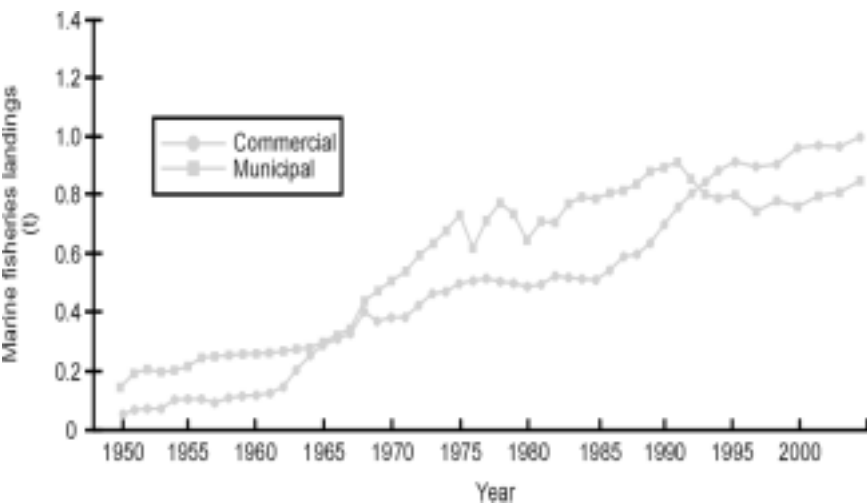


Figure 19. Philippine fishery production contributions by sector.⁸

Table 2. Total fish catch of the seven of top ten most important species compared between municipal and commercial fishing sectors.¹¹

Fish species	Municipal volume (t)	% total municipal catch	Commercial volume (t)	% total commercial catch
Japanese scad (<i>galunggong</i>)	32,290	3.9	196,588	23.6
Bali sardinella (<i>tamban</i>)	38,639	4.6	153,523	18.4
Fringescale sardinella (<i>tunsoy</i>)	45,978	5.5	58,610	7.0
Frigate mackerel (<i>tulingan</i>)	51,899	6.3	56,595	6.8
Indian anchovy (<i>dilis</i>)	43,160	5.2	35,518	4.3
Yellowfin and bigeye tuna (<i>tambakol</i>)	36,387	4.4	30,955	3.7
Bigmouth mackerel (<i>alumahan</i>)	27,418	3.2	25,765	3.1
Total	275,771	33.1	557,554	66.9

What aggravates matters for municipal fisheries is that, of the seven top species caught by both sectors, 66.9% are harvested by commercial fishers while only 33.1% are caught by municipal fishers (Table 2).

This could suggest that, although the commercial and municipal fishing industries are purported to be two distinctly different sectors, they are in fact competing directly with each other. In this situation, where fish catch has leveled off and fisheries appear to have reached their maximum production levels, if law enforcement remains weak, the further expansion of commercial fisheries could only mean the decline of municipal fisheries – any increases in commercial fishing effort will take a larger proportion of the already dwindling catch away from the municipal fishers. Indeed, municipal fishers are now getting only 45.6% of the total Philippine catch, while commercial fishers are reaping 54.3% (Figure 20).²⁷ This is in sharp contrast to the 1950s when 70% of the country's fish supplies came from municipal fishers.

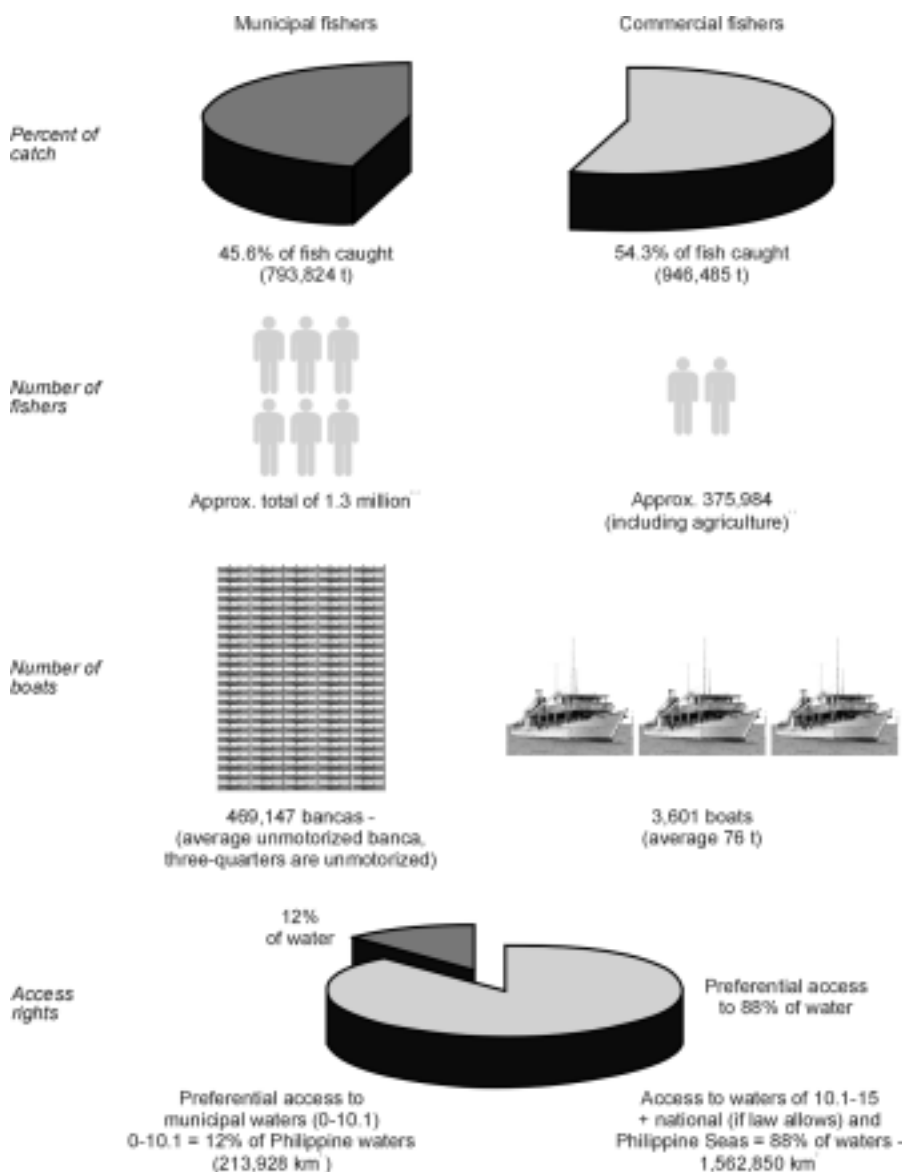


Figure 20. Distribution of fish catch and other resources between municipal and commercial fishers in the Philippines.

BANKING ON ECONOMIES OF SCALE

The growth of the commercial fishing industry is a success of sorts for the government, which has vigorously promoted the expansion of the sector. With foreign development assistance, mostly in the form of loans, from various donor countries, the government has provided the necessary infrastructure to drive the development of commercial fishing hubs, such as General Santos City in Mindanao. As noted in Figure 21, this assistance shifted more to conservation and resource management after the late 1980s. Nevertheless, despite evidence of overcapacity in the commercial fishing fleet, the country is still encouraging investments in the industry, as shown by the increase in total tonnage of its fishing fleet (Figure 22).

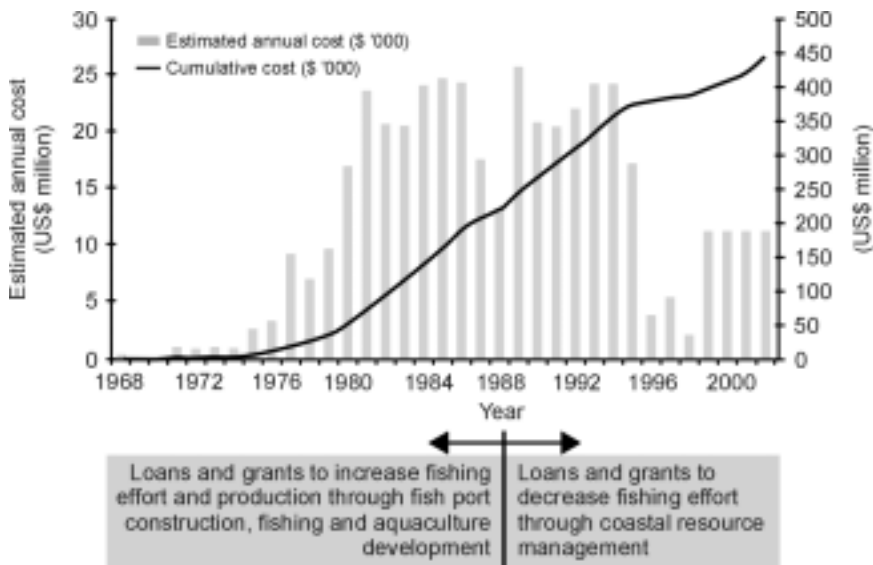


Figure 21. Trends in external assistance to the Philippine fisheries sector.²

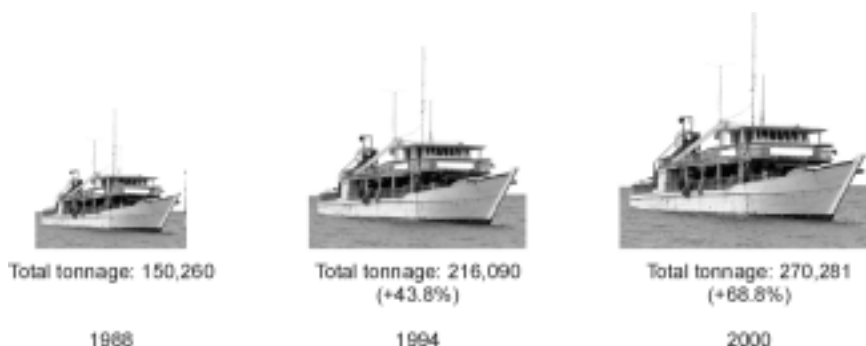


Figure 22. Commercial fishing boat tonnage increases since 1988.¹¹

In 1997, the commercial fishing effort in the Philippines, at 2.09 million HP, was estimated to be 45% above the optimum level of 1.14 million HP.⁵⁰ The commercial fishing industry has continued to receive both direct and indirect subsidies, tax breaks and even a rebate on fuel oil tax through the Department of Finance, which are intended to improve their capacity to travel farther offshore and explore underdeveloped fisheries, especially in the Philippine exclusive economic zone (EEZ). Imports of boats over 40 GT, sonar, fish finders and other fishing paraphernalia are exempted from taxes and other import duties. An owner of a 30 GT commercial fishing boat pays a minimal “license fee” of P1,000-3,000 every three years to the government through the Department of Agriculture-Bureau of Fisheries and Aquatic Resources (DA-BFAR) to have access to millions of pesos worth of fish in one of the world’s most productive fishing grounds.¹²

The annual revenues earned by BFAR from fisheries licenses (commercial fishing boats, gear, etc.), registration and cash bonds total around P2.2 million¹⁸. This represents a miniscule 0.0012% of the value of fish (P34 billion) caught by commercial fishers in 2000 (Table 3).

Government support for the commercial fishing sector is motivated by a real need to move fish from sea to market in an efficient and cost-effective way. All things being equal, it is cheaper to transport goods over long distances in bulk than in individual units. The bigger the volume transported, the cheaper the goods will be per unit when they get to the market.

Table 3. Subsidies and tax breaks for commercial fishing industry.

Direct		Indirect	
Tax subsidies on imported boats (AFMA)	Executive Order (EO) 127, amended and extended in EO 209	Infrastructure development – ports, ice plants for commercial fishing use, tax discounts on fuel products, overseas loans for fisheries port development in such places as General Santos, Batangas, Toril, Davao and others	Loans from Japan Bank for International Cooperation
Tax subsidies on imported equipment (AFMA)	EO 209		
License fees for rights to fish in Philippine waters are very low compared with other countries ¹⁸	Fisheries Administrative Order 198		

Viewed solely from this perspective, the economies of scale do indeed work for commercial fishing and food production. The commercial fishers' big boats give them the ability to travel farther distances and cover more distant fishing grounds, within and beyond the Philippine EEZ. They can catch and carry large volumes of fish that allow the establishment of fish ports with intermodal transport systems designed to deliver fish to the demand centers faster and more efficiently. Such increased efficiency is supposed to improve the government's capacity to supply the fish requirements of the domestic market — mainly anchovies, sardines and scads — as well as tap lucrative seafood markets in developed countries, that pay a premium for the most sought-after species, e.g., tuna, shrimp and lobster.



S.J. Green

The world's most expensive fish, a blue fin tuna, sold on 5 January 2001 at Tokyo's main market for US\$173,600 - that's US\$900 (P45,000) per kilo!⁴²

Other species are also affected, e.g., the price of the common *galunggong* (scad), once considered as one of the most accessible and a “poor human’s fish”, has increased steeply over the last few years as indicated in Figure 23. Such increases are now the norm among many similar species.

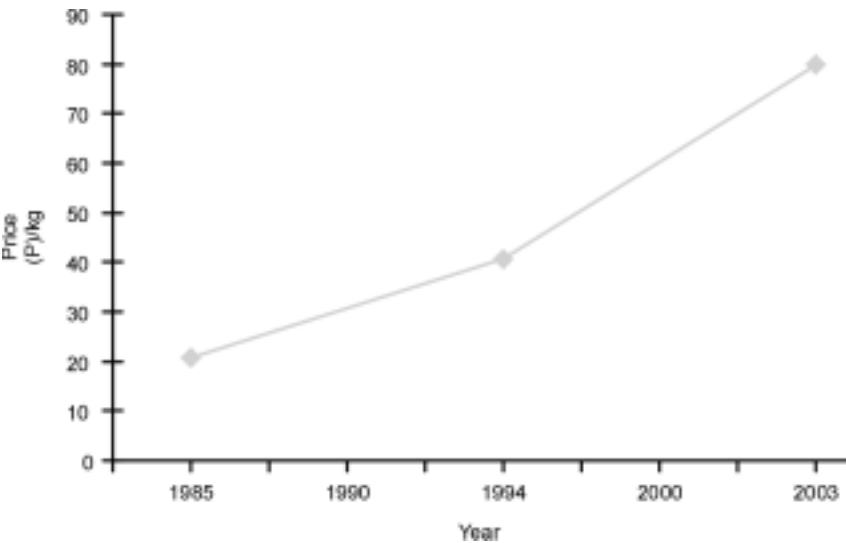


Figure 23. Change in the price of scad (galunggong) since 1985.⁸⁹

Achieving Food Security

The Fisheries Code of 1998 (Republic Act 8550) states that achieving food security is “the overriding consideration in the utilization, management, development, conservation and protection of fishery resources.” It also states, “Food security may be achieved through self-sufficiency (i.e., ensuring adequate food supplies from domestic production), through self-reliance (i.e., ensuring adequate food supplies through a combination of domestic production and importation), or through pure importation”.

This implies that, over and above other considerations, the state must ensure that domestic markets are supplied with enough fish to feed the nation, regardless of whether such fish supplies are taken from the country’s own marine capture fisheries, imported

from other countries or produced by other means such as aquaculture. Through the development of commercial fishing, government makes possible exports of high-value species, such as tuna, which bring in much-needed foreign exchange, which the government can use to buy a lower-value species – anchovies, for example – for the domestic market at a lower cost than if the country were to produce such species locally. Cheaper fish will then benefit everyone, including even the small fishers themselves. But even cheap fish are getting expensive as shown in Figure 23.

Sustaining the country's marine capture fisheries over many generations need not be a national priority, as long as the state has the means to supply the quantity of fish necessary to meet the country's food requirements. In some respects, in the face of the alarming decline of Philippine fisheries and global trends toward trade liberalization translating to lower tariffs and cheaper imports, importation would seem to be a logical policy to pursue.

The problem with this thinking is that it assumes that national fisheries are well managed. This implies that commercial fishers are fishing where they should be, that municipal fishers have adequate protection under the law, that income sources besides fishing are available to subsistence fishers, and that, overcapacity is not depleting the stocks. But, this is not the case as explained below.

NO LEVEL PLAYING FIELD

Recognizing the growing competition for the country's diminishing fish stocks and that the scale has tilted heavily in favor of commercial fishers, Philippine policy at the highest level explicitly proclaims a bias for small-scale fishers. The Philippine Constitution of 1987 grants subsistence fishers preferential rights over communal waters (Article 13, Section 7) and the Fisheries Code of 1998 spells out such rights by giving municipal fishers preferential access to "municipal waters," defined under the Code as:

Section 4(58). Municipal waters — include not only streams, lakes, inland bodies of water and tidal waters within the municipality ... public forest, timber lands, forest reserves or fishery reserves, but also marine waters included between two (2) lines drawn perpendicular to the general coastline from points where the boundary lines of the municipality touch the sea at low tide and a third line parallel with the general coastline including offshore islands and fifteen (15) kilometers from such coastline. Where two (2) municipalities are so situated on opposite shores that there is less than thirty (30) kilometers of marine waters between them, the third line shall be equally distant from opposite shore of the respective municipalities.”

Policy, however, has yet to be fully translated into action. To begin with, the municipal waters of most of the country’s 832 coastal municipalities and 75 coastal cities³⁸ have yet to be properly delineated and enforced. Intrusion by commercial fishers in municipal waters is rampant. Overall, law enforcement is spotty. Many commercial fishers, long used to fishing everywhere, continue to do so without legal consequences. They insist they are being unjustly driven out of their traditional fishing grounds. However, the law gives small fishers priority access to only 17% of the total marine waters of the country; commercial fishers can still fish the remaining 83% (Figure 24).¹⁷

All this has resulted in a lopsided competition between the two key stakeholders of Philippine fisheries, who, for the most part, catch the same fish, in the same fishing grounds and sell to the same market. It is well-known that commercial fishing boats continue to operate within the municipal waters, directly competing with municipal fishers. In the absence of a clear move by the commercial fishing industry to move out into the EEZ and in the face of weak enforcement of prohibitions against commercial fishing in municipal waters, subsidies for commercial fishers are creating unfair competition for small fishers.

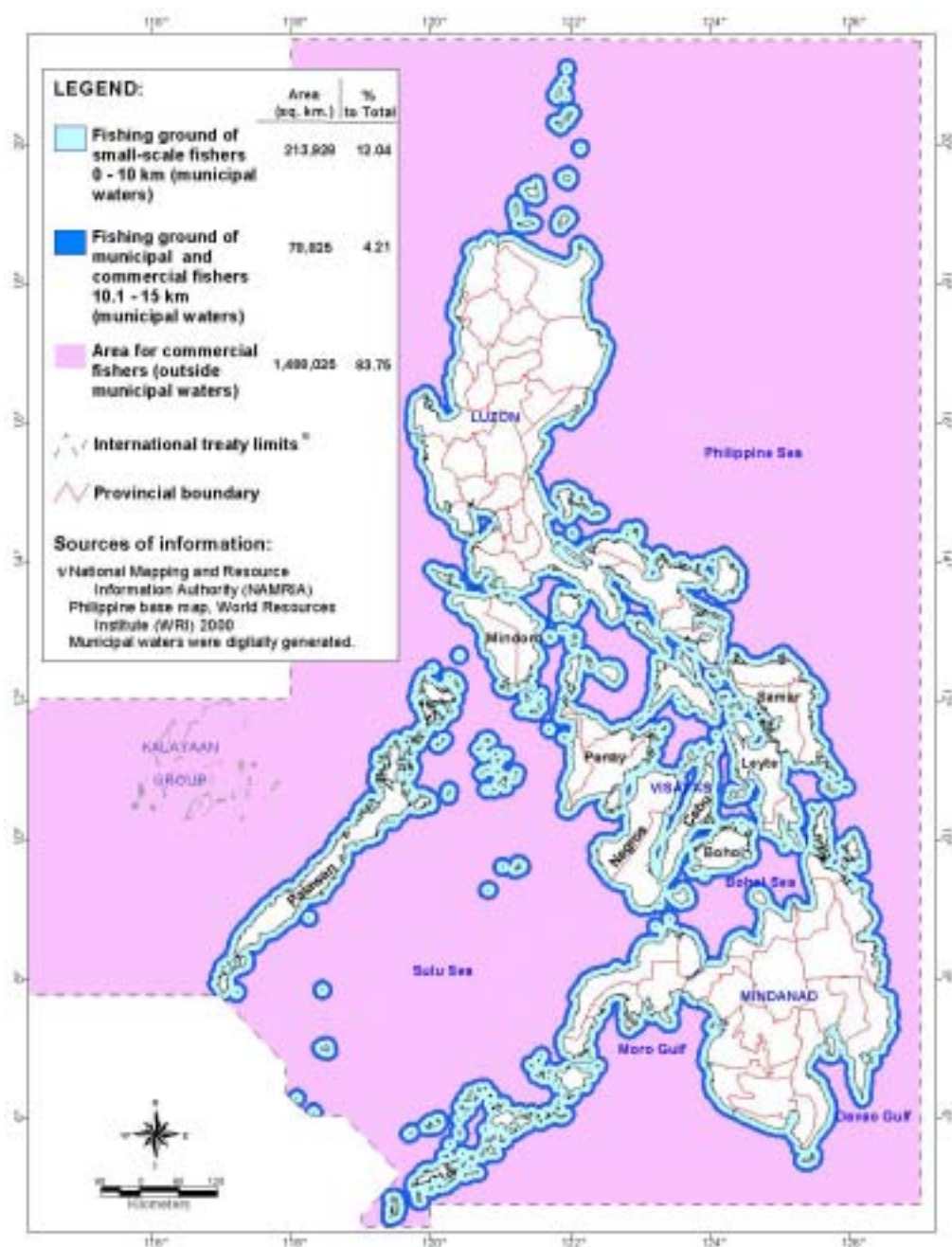


Figure 24. Philippine archipelago with municipal waters delineated to 15 km offshore as stipulated by the Fisheries Code (RA 8550).¹⁷



*Commercial size fishing vessels often compete with small-scale fishers in municipal waters.
(Photos by S.J. Green)*

Meanwhile, Chinese, Malaysian, Taiwanese, Japanese and other fishers from neighboring countries are making free use of the Philippine EEZ. The government's move to create commercial fishing hubs by developing new fish ports and facilities are merely encouraging more intrusion into the EEZ, by allowing international flag vessels to land fish in these ports.

At the household level, the decline of municipal fisheries means less fish available for the fisher family's own consumption. The decrease in per capita consumption of food fish noted in Chapter 2 is particularly pronounced in fishing communities that sell fish to urban consumers. This is because, as the supply of fish decreases in absolute terms and relative to demand, fish prices in the cities are shooting up. This prompts fishers to sell their most valuable catch for cash income to buy rice or other staple food "more filling" than fish, leaving only small and poorer quality fish, if at all, for their own consumption.²⁷

Unfortunately, in many places, the ordinary fisher's catch now consists mainly of smaller, low-value fish that, even when sold,

earns just enough for a family's subsistence.⁴¹ The socioeconomic situation of small-scale fishers in the Philippines has not improved in recent years, but has deteriorated as noted in Table 4. Annual income estimates for municipal fishers from various case studies between 1978 and 1998 show that the real income of fishing households has remained low relative to the national income.²⁷ In 2002, based on a survey in six provinces, up to 80 percent of fishing households were living below the poverty threshold.² Finally, the discrepancies of access between municipal and commercial fishers are highlighted in Table 5.

Table 4. Annual income estimates for municipal fishers from various case studies.

Study site	Estimated annual income (US\$)	Year (Reference)
Misamis Oriental	750 for owners of motorized vessels, 625 for owners of nonmotorized vessels	1978 (45)
Nationwide	675 for fishing households, includes nonfishing activities	1985 (56)
Lingayen Gulf	206 average from a random sample of study sites around the gulf	1989 (5)
Fisheries Sector Project (FSP) selected areas	1,059 weighted average for owners of motorized (27%) and nonmotorized (63%) vessels ^a	1996 (69)
Olango Island, Cebu	456 average for all fisheries-dependent families on the island	2001 (60, 74)

^aThe relatively high income may reflect the effect of FSP or a bias in the survey to motorized boats.

TRADE: POOR EQUALIZER

Increased international trade in fish is offered as a solution to the country's food security dilemma. The Philippines has a good number of high-value fish species preferred by consumers in developed countries. These species – grouper, shrimp, lobster and tuna – are the icons of “luxury consumption.” Compared to the icons of food security – anchovies, sardines and scads – they are

Table 5. Comparison of municipal and commercial fishing advantages

Municipal fishing	Commercial fishing
Preferential access to waters 15 km offshore but very weak enforcement	Generally, open access to all coastal waters and EEZ
17% of coastal waters (292,253 km ²)	83% of coastal waters (1,488,025 km ²)
	Foreign vessels routinely sighted in EEZ and coastal waters
Value of nearshore fisheries severely degraded over last 30 years	Offshore fish stocks less overexploited than nearshore fisheries
Nearshore habitats degraded by destructive fishing pollution, land uses, etc.	Offshore fish stocks, not habitat-dependent

expensive, which puts them out of reach of low-income families. Relatively rare, they are not produced in the quantities needed to feed the nation. Exporting them generates foreign exchange, which can be used to purchase inexpensive food fish from the international market to meet domestic food requirements.

In 2000, the Philippines exported a total of 199,719 t of fish and fishery products valued at US\$506.6 million. It imported 242,464 t of fish and fishery products, of which over two-thirds were fresh/frozen and chilled fish for human consumption worth some P3.85 billion (US\$93.8 million).¹¹

Although creating a trade surplus, importation does little to alleviate the plight of small fishers. By itself, the availability of inexpensive imported fish in the market offers no guarantee that the small fisher will be able to afford to buy fish to feed his family. For importation to benefit not only middle and upper income groups, the state must provide the small fisher the protection of his preferential and legal access to municipal waters.

At the core of ensuring food security is the goal of raising the income and quality of life of those in need of nutrition.

Ultimately, fish consumption that contributes to the food security of the nutritionally needy population groups can be achieved only by decentralized, domestic production, processing and marketing. While sustainable international trade can effectively supplement this role, it cannot be the substitute.⁵⁵

Food security is about satisfying basic nutritional needs; trade responds to effective demand, opens up new markets and increases demand for fishery products.⁵⁵ Without proper safeguards, trade can lead to increased private investment in an already overcapitalized fishing industry eager to intensify its fishing effort, heightened conflicts between commercial and municipal fishers, and a further decline – or collapse – of fish stocks.

Presently, the Philippines is losing about US\$120 million every year due to overfishing and the losses are increasing yearly.⁴⁸ This implies the following:

- ◆ Every Philippine fisher is losing a vital source of protein and income.
- ◆ Commercial fishers, because of poor law enforcement, are able to continue to increase their capacity to fish in municipal waters.
- ◆ Municipal fishers are taking the brunt of these losses.
- ◆ Imbalance in fisheries that is causing overfishing is having the greatest impact on the poorest segments of society.

Fishing is the only means of livelihood for at least 1.3 million Filipinos engaged in small-scale fishing. It may now take hours for fishers to catch enough fish for food, but for this segment of the population, fishing is better than having no income at all. Given current economic realities, finding gainful alternative employment for these fishers and their families is difficult.

Meanwhile, the government is losing millions in potential revenues by undervaluing the license fee, or what economists term “resource rent”, that commercial fishers must pay for access to valuable fishery resources. The Development Academy of the Philippines estimates that a 100% increase in the license fees for commercial fishing boats will not affect the profitability of purse

seiners, that in 1996 earned a net income of up to P38 million per boat.²² If commercial fishing licenses were pegged at a higher level to account for a true resource rent, commercial fishing licenses could help deter further increases of effort. Likewise, more realistic license fees could be utilized to offset costs of enforcement of the rules of the commercial fishing vessel license fee (Figure 25).

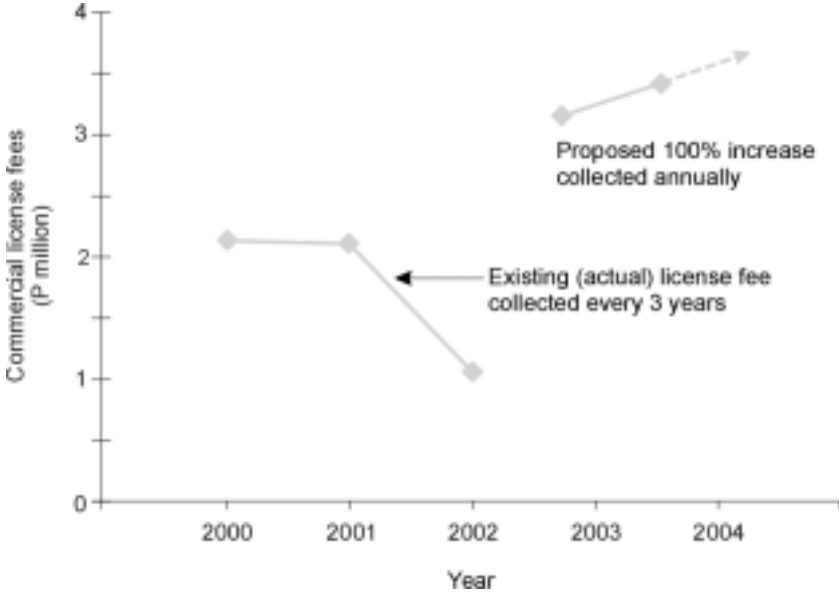


Figure 25. Revenue to government from license fees to compensate for resource rents lost and enforcement.¹⁸

An example of commercial inefficiency is when government introduced the shrimp trawl to the Philippines under the policy thrusts of Presidential Decree 704. This proceeded to overfish and deplete the shrimp fishery as well as destroy much bottom fishery habitat. It was also government that encouraged the conversion of mangroves to shrimp farming in the 1970s, resulting in the destruction of more than 50% of the country’s mangroves and the creation of 239,233 ha of brackish fish and shrimp ponds.⁸⁹ Government land was, and still is, offered for fishpond development at a small fee of P8,600/ha/10 years, which translates to P860/ha/year (RA 8550), along with interest-free loans, most of which are defaulted on. The export-oriented shrimp industry generated foreign exchange, but it did so at a tremendous expense

to the productivity of nearshore fisheries. Municipal fishers have suffered a large decline in their fish catch due to the loss of critical mangrove and bottom habitats.

A CALL TO CHANGE

In Article 11.2.15 of the Code of Conduct for Responsible Fisheries, the Food and Agriculture Organization (FAO) calls on states and other organizations to: “ensure that their policies and practices related to the promotion of international fish trade and export promotion do not result in environmental degradation or adversely impact the nutritional rights and needs of people for whom fish is critical for health and well-being and for whom other comparable sources of food are not readily available or affordable”.

Food security requires the efficient use of food resources for the benefit of the whole nation. In this context, small fishers are far more efficient than commercial fishers. They do not destroy the habitats when using traditional gear. Unlike commercial fishing operations, they have little investment in the fishery, have low overhead costs to deal with, and only need to catch a few fish to “break even”. The benefits from their fishing accrue directly to the families, who most need them. They use fishery resources efficiently and distribute these among themselves to a point. But as for all means of exploiting fisheries there are limits to the number of municipal fishers that can efficiently and sustainably fish.

Food security calls for an integrated approach, focusing on managing the resources both efficiently and equitably. National policies must recognize the limits of fish as a biological resource. The main fishing grounds of the country are already beyond their peak of production. Encouraging investments in new boats and issuing more commercial fishing licenses will not help to catch any more fish in these fishing grounds; it will just distribute those fish caught differently. Government therefore must redirect its effort and money toward management of the nation’s fisheries through clear law enforcement and the capacity of LGUs to manage their waters effectively. Subsidies, even when meant to encourage the commercial fishing sector to focus its efforts on the EEZ, must be used only for that purpose and to encourage sustainable fishing.⁸⁴

Coastal law enforcement should be the recipient of subsidies and tax rebates. Gasoline incentives and purchase of technologies for law enforcement must be given a priority so that local governments and law enforcement agencies will be able to get out and monitor the use of Philippine fishing grounds. This focus also offers a variety of other positive benefits, including controlling smuggling, drug trafficking and the movement of terrorists, some of the country's top priorities. Plus, losses due to overfishing will decline.

M.N. Guidote



Active coastal law enforcement is a major deterrent to illegal fishing.

Without a doubt, as trade liberalization opens up new markets for marine fishery products, the pressure on government to develop fisheries for export will increase. Already, demand for live food fish, aquarium fish and other marine fishery

products is driving prices to unprecedented levels. Products that used to be sold by box, are now being sold by individual specimen, and live food, such as certain species of wrasse and grouper, are fetching prices in excess of US\$50 apiece. Market projections indicate that fish prices will go up by 4-16% by 2020.²⁵

Still, the only way government can truly achieve food security is through sustainable fisheries for all including small-scale fishers. Food security is not only about having food in the markets, but it is also about self-sufficiency and developing strong economic sectors within the country that provide the nation's food. The establishment of a strong small-scale domestic fisheries sector that supplies local markets with nutritious food is an indispensable bedrock of the Philippine economy. Without these key foundations, the economy will falter.

Both municipal and commercial fishing sectors are vital to a successful Philippine fisheries industry. The government needs to develop a fisheries development strategy that considers both sectors and their needs, and balances the needs of international trade and economics with the issues of equitable distribution, poverty and food security. Given the current status of its fish stocks, the Philippines would benefit socially, biologically and economically in the long term if government were to exercise its strong policy bias for small-scale fishers by assisting to strictly enforce coastal laws in the overfished sections of the country, while helping commercial fishers tap fisheries outside municipal waters.

In summary, here are some fishery facts and fallacies:

Fallacy: Fish will never disappear, they are just seasonal.

Fact: Fish will disappear once abundant species are depleted from the Philippines. The seasonal fishes, which come in large numbers, are either fishes on spawning runs or juveniles.⁶⁵

Fallacy: Small-scale fishers cannot supply enough fish for national food requirements and have very inefficient catching methods.

Fact: Small-scale fishers are in fact the most efficient type of fishers. They only take what they need and they tend to leave enough fish for spawning next year. Also they use very little equipment, spend very little to catch fish and rarely waste their catch because everything they catch gets eaten or sold. The exception to this is when they use destructive methods or are too numerous for a localized small-scale fishery.

Fallacy: Without commercial fishing in municipal waters, the poor human's fish will become expensive.

Fact: Commercial fishing is very inefficient and wasteful. It harvests young fishes and spawning aggregations. Reducing the ability of the fishes to reproduce leads to less production in future years. In most cases, commercial fishing actually reduces fish production and, because of its high capital requirement, provides consumers with more expensive fishes. Supply and demand will encourage more fishing effort when stocks are still plentiful.

Fallacy: Capture fisheries are not so important since aquaculture will eventually replace them.

Fact: Aquaculture can be a useful tool in fisheries management if it is managed well and its impact is minimized for species that are relatively low-priced such as milkfish and *tilapia*. However, because it involves a capital outlay, it is beyond the reach of most small fishers and will not be able to provide livelihood for the country's more than one million small fishers. Furthermore, aquaculture generally focuses on high-value and high-profit species, such as shrimps, groupers and snappers. Its expansion will generally not help local food security, but provide more products for the urban and international markets and redirect the benefits of fisheries to the hands of a few who can afford it. If not managed properly, it can also have major impacts on water quality, result in fish kills and prove to be not sustainable and profitable. Compared to municipal fisheries, aquaculture is a much more complex and expensive way of producing food.

Chapter 5

A Philippine Agenda for Food Security: Urgent Steps toward Sustainable Fisheries

“Zoning the oceans into unfished marine reserves and areas with limited levels of fishing effort would allow sustainable fisheries, based on resources embedded in functional, diverse ecosystems.”⁶⁶

Looking at recent trends, it is clear that the current fisheries thrusts in the Philippines are not enough to promote food security. There is a need to completely refocus the strategies for ensuring a reliable, affordable domestic supply of fish or, “fish security”, rather than “fisheries modernization”. The need is to assist the ailing municipal fisheries sector and not to pursue the development of a highly efficient commercial fishing fleet. National government must adopt a fisheries management framework strategy anchored on integrated coastal management (ICM) that emphasizes participatory planning, implementing and monitoring of sustainable uses of coastal resources, and focused on real fish security for the benefit of all fisheries users, with a bias toward the majority of stakeholders, the municipal fishers.

FISHERIES MANAGEMENT: KEY TO SUSTAINABLE FISHERIES

Ideally, each fish species should be managed in order to obtain the optimum production from it. However, in a country with over 2,500 species, this would be impossible, given the present state of fisheries management. A more practical and effective approach is to manage the fisheries as a whole and help the natural rehabilitation process through law enforcement, gear restrictions, licensing, marine sanctuaries and other measures. Collectively, these interventions are referred to as “fisheries management” within the context of ICM.

Fisheries management entails a complex and wide-embracing set of tasks, aimed at ensuring that the optimal benefits are obtained for the local users, province or region from the

sustainable utilization of the living aquatic resources to which they have access. The FAO defines it as “the integrated process of information gathering, analysis, planning, consultation, decision making, allocation of resources and formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities in order to ensure the continued productivity of the resources and the accomplishment of other fisheries objectives”.²⁸

A rice farmer harvests rice once or twice a year. Perhaps he will sell most of it, or keep it for his family’s consumption. But always he sets aside an adequate number of seeds for the next planting, because if he does not, he will have no rice to plant, and therefore no rice to harvest and sell in the next season. The same principle applies to fisheries. The only way fisheries can become sustainable is for all stakeholders, including the government, to manage the fisheries so that there are always sufficient resources in the sea to enable the stock to reproduce and provide the optimum amount of fish each year (Figure 26).

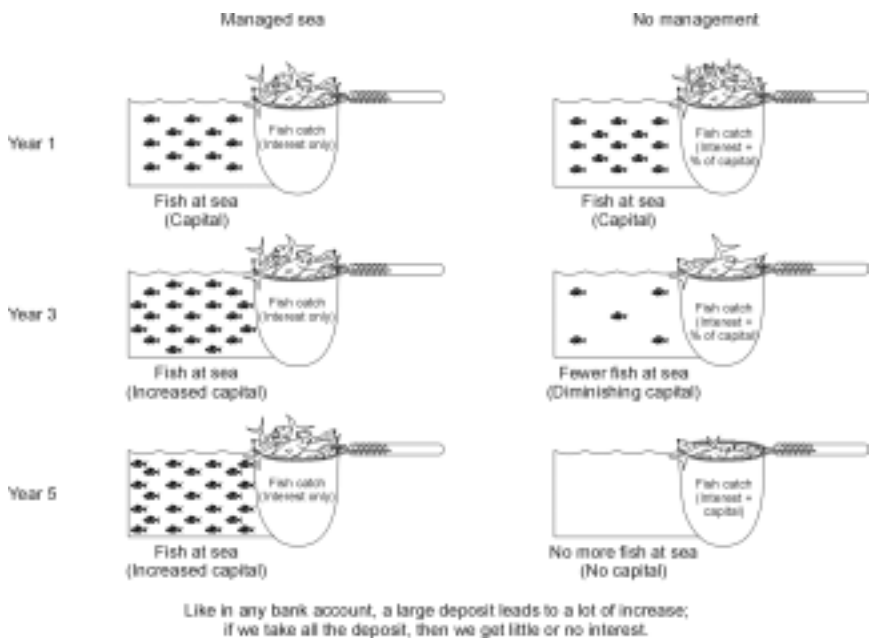


Figure 26. Bank account and sea analogy.

A key goal of fisheries management should be to maintain supplies of protein to the nation for present and future generations, while protecting and ensuring a livelihood for as many fishers as possible. This goal can be achieved through the following objectives and outcomes:

- ◆ maximizing sustainable catches;
- ◆ maximizing economic returns from fishing;
- ◆ maintaining spawning stocks;
- ◆ minimizing bycatch, waste and post-harvest losses;
- ◆ limiting the number of fishing units to a sustainable number;
- ◆ limiting the efficiency of all types of fishing gears to ensure minimum inputs and maximum outputs within municipal waters;
- ◆ closing fishing grounds deemed to be overfished;
- ◆ ensuring minimum mesh sizes and escape gaps left for endangered species;
- ◆ setting limits on the fish sizes (minimum and maximum legal lengths) that can be legally caught;
- ◆ setting catch quotas (limits on the amount that can be caught); and
- ◆ enforcing regulations and laws.

An ideal fishery would have the following characteristics:

1. Biologically acceptable - fishing effort is within the limits that do not affect the ability of the fish stock to reproduce, thereby ensuring the same, if not more, fish each year.
2. Economically efficient - the amount of fish caught for a certain type of effort is profitable to the fishers and businesses involved.
3. Socially beneficial - the most needy population groups and the majority of stakeholders, the municipal fishers, get the bigger share of the catch to ensure their traditional and subsistence livelihoods are maintained.

The Marine Stewardship Council, a UK-based organization formed in 1997, “certifies” fisheries that recognize “the need to

observe the long-term interests of people dependent on fishing for food and livelihood” based on three main criteria: condition of fish stock, impact of fisheries on the marine ecosystem and fisheries management system.

The council defines a sustainable fishery as one which:

- ◆ can be continued indefinitely at a reasonable level;
- ◆ maintains and seeks to maximize ecological health and abundance;
- ◆ maintains the diversity, structure and function of the ecosystem on which it depends as well as the quality of its habitat, minimizing adverse effects;
- ◆ is managed and operated in a responsible manner, in conformity with local, national and international laws and regulations;
- ◆ maintains present and future economic and social options and benefits; and
- ◆ is conducted in a socially and economically fair and responsible manner.

Who is Responsible

Fisheries management in the Philippines is a responsibility of both the national government and local government units (LGUs). As frontline stewards of the country’s coastal resources, the LGU is responsible for the delineation of its municipal waters as provided in Section 4 (58) of the Fisheries Code of 1998. As

A.T. White



Municipal enforcement is essential for fisheries management.

provided by Section 16, Rule 16.9 of the Code, LGUs are also mandated to enforce fishery laws, rules and regulations and fisheries ordinances in municipal waters. The municipal and city legislative councils, upon consultation with their respective municipal Fisheries and Aquatic Resource Management Councils

(FARMCs), create the laws, and the local chief executives ensure that they are implemented.

The Bureau of Fisheries and Aquatic Resources (BFAR) is the primary national government agency responsible for what happens to the country's fishery resources. The agency has jurisdiction over the waters outside municipal waters, a vast area spanning some 1,750,000 km², about 84% of the territorial waters of the Philippines. It issues licenses to commercial fishers and assists in law enforcement. It is also mandated to conduct research on the status of fisheries and a variety of other vital functions aimed at managing and utilizing Philippine fishery resources in a sustainable manner.

The Fisheries Code has opened up many avenues for better fisheries management in the country. For example, Rule 3.1 directs BFAR to coordinate with LGUs, FARMCs, and other government agencies in the development, conservation, protection, utilization and management of fisheries and aquatic resources. Section 8 instructs the agency to coordinate with LGUs in the establishment of catch ceilings and closed seasons in municipal waters. The LGUs are mandated to pass local ordinances that enhance national laws and to improve specifications of fisheries management in the local context.

A PROPOSED FRAMEWORK FOR FISHERIES MANAGEMENT IN THE PHILIPPINES

Ultimately, the solutions to fishery problems are the same as those that combat the issues of poverty – a good population program, massive education, and increased employment opportunities.^{27, 68} To maintain the food security of the nation, the government must move away from the reactive management of the past and focus on uplifting the most needy sectors of society in the coastal areas. The only way that the country can increase its fish production and at best maintain current levels of catch is to institutionalize ICM with a strong fisheries management component program at the LGU and national government levels, that considers the following key critical results needed for ensuring sustainable fisheries.⁶⁷

1. Fish security for municipal fishers is recognized as the most effective strategy for successful and equitable management of Philippine fisheries that benefit the whole country.
2. National policy implementation is coordinated, harmonized and integrated toward the creation of a clear national fisheries management policy, which will serve as basis for the development of a national fisheries management plan through consolidation of regional fisheries management plans.
3. Fishing effort is redistributed and ultimately reduced to sustainable levels across the whole country, including its EEZ, through fisheries management, closed areas and better coastal law enforcement.

To achieve these critical result areas, the following action agenda is proposed to be adopted at the various levels of government.

National Level

National government and key policymakers must refocus the whole food security program of government away from fisheries for export toward management and conservation of the country's marine resources for the food security of Filipinos, thereby ensuring the availability of sufficient levels of fish to the most economically and nutritionally needy population groups. In addition, they must:

- ◆ develop a national policy which integrates the habitat management mandates of the Department of Environment and Natural Resources (DENR) with the fisheries mandates of BFAR into an "ecosystem approach through ICM";²⁷
- ◆ harmonize national policy to unite the current competing municipal and commercial fishers into a united direction which will help to sustain fisheries countrywide for the best interests of both sectors;² and
- ◆ because BFAR's thrusts of protection and management are in conflict with the production and agribusiness thrusts of

the Department of Agriculture (DA), BFAR should be reinstituted as a line bureau.

Regional Level

At this level, the government must work at strengthening the role and functions of regional fisheries offices. It must:

- ◆ redirect resources away from “input-assisted projects” to CRM, monitoring, control and surveillance, and the National Stock Assessment Project (NSAP) sections to assist provincial and local governments in fisheries management and coastal law enforcement; and
- ◆ develop regional fisheries management plans which focus on regional issues and solutions.

Provincial Level

At this level, the government must focus on strengthening the role of the Provincial Fishery Office and the Environment and Natural Resources Office by:

- ◆ encouraging Provincial Fishery Offices to assist in fisheries management on a province-wide level, in full coordination with provincial governments, and to assist coastal LGUs in implementing their fisheries plans from within their five-year multiprogram CRM plans;
- ◆ identifying key fisheries “hotspots” such as spawning areas and juvenile grounds through participatory assessments and scientific studies for priority management and encouraging inter-LGU management agreements;
- ◆ developing provincial fishery management plans, building on municipal CRM plans and integrating the regional fishery management plans;
- ◆ focusing human and financial resources on coastal law enforcement; and
- ◆ standardizing province-wide licensing systems per LGU for easy identification of boats to give a guiding framework upon which LGUs can initiate their limited effort regime.

Municipal Level

Municipal LGUs, with technical assistance and counterpart funding from the provincial government and pertinent national government agencies, must do the following:²⁷

- ◆ Set in place the following essential management components:
 - participatory coastal and fisheries resource assessment;
 - CRM plans with clear fisheries management strategies and interventions laid out;
 - functional municipal coastal law enforcement units with allocated resources and workable logistics; and
 - basic municipal ordinances (in accordance with the Fisheries Code);
- ◆ Implement the following interventions as part of multi-year CRM and fisheries management plans:
 - delineation of municipal waters adopted through a municipal ordinance;
 - registration and licensing of municipal fishers, fishing boats and gears;
 - color-coding of fishing boats;
 - establishment and management of marine sanctuaries and reserves with strict no-fishing zones larger than 10 ha;⁸³
 - setting of limits on fishing access, with preferential access to resources given to local fishers;
 - enforcement of market denial system for endangered and illegally caught species;
 - inter-LGU collaboration to address issues of common concern;
 - declaration and enforcement of closed seasons and closed areas;
 - prohibition of destructive and overefficient fishing gears; and
 - exclusion of all commercial fishing activities from municipal waters.

Barangay (Village) LGU

Efforts at the barangay level must focus on:

- ◆ initiating co-management with the municipal LGU in the implementation of various fisheries management tools;
- ◆ converging the efforts of nongovernment organizations, people's organizations and national government agencies with the LGU framework for coastal and fisheries management;
- ◆ managing marine sanctuaries and enforcing laws at the community level;
- ◆ providing vital intelligence to LGU, national government agencies and the Philippine National Police on illegal activities occurring in the village; and
- ◆ allocating counterpart funds and human resources for coastal and fisheries management activities.

A policy guide useful for all fisheries management is summarized below.

The FAO Code of Conduct for Fisheries: Philippine applications.³⁴

Realizing that world trends in fisheries were pointing toward serious overfishing, FAO in 1997 established a code of conduct for fisheries management. The code is an agreement among countries, including the Philippines, which governs fishing and fishery sectors' principles and practices. It covers the various fisheries sectors and includes fisheries management, fisheries operations, research, aquaculture development, integration of fisheries into coastal area management (CAM), post-harvest practices and trade.

The key features of this code and the ways by which they can be applied to the Philippine setting are described below:

Ensuring the health of fish producers and consumers. LGUs should ensure that the livelihood of small fishers is maintained and that fishing methods and marketing procedures do not endanger the health of consumers and producers of fish.

Responsible fisheries. The government must promote fishing which is safe to human life, nondestructive to resources, documented, selective, efficient in the use of energy, adoptive of appropriate technology, well-assessed as to its effect upon habitat, and effective at decreasing discards and minimizing loss of fishing gear.

Fisheries research. BFAR and LGUs should support fisheries research and allow staff to be trained in fisheries research. Research should form the basis of decisions. Quick and easy methods such as CPUE data collection and participatory fishery resource assessments, supported by scientific studies, should be conducted to provide a good basis upon which decisions may be made. Data should be consolidated and presented in a nonscientific format that key stakeholders can easily understand.

Integration of fisheries into CAM. Government must promote the participation of all stakeholders in decisionmaking and planning; appropriate accounting of costs and benefits, including environmental, social and cultural aspects; monitoring of physical, chemical, biological, economic and social parameters; and establishment of mechanisms for cooperation and collaboration among all entities with interests in fishery resource.

Inter-LGU cooperation. Fish stocks know no political boundaries. LGUs must cooperate and coordinate with each other in order to manage fish stocks successfully. Bay councils, law enforcement councils and integrated FARMCs are some of the mechanisms mandated by law to promote inter-LGU cooperation.

Ecosystem-based management. There is a need to manage all components of the ecosystem upon which fisheries depend. Management must include protection of the habitats of fishes in different parts of their life cycle as well as mitigation of land-based activities that affect quality of the sea, such as pollution and land reclamation, which remove critical habitats.

Precautionary approach. In the absence of scientific information and hard evidence of negative environmental impacts, government must adopt a proactive precautionary approach as the main strategy for fisheries management, i.e., when in doubt, it is best to error on the side of caution. This approach is most useful in cases where LGU or BFAR contemplates banning certain fishing gears because of their possible harmful impacts.



Marine protected areas with strict no-fishing zones are an excellent fishery management tool while also providing many additional benefits.

Choosing the Future Now

Government support to commercial fishing has not produced the intended result of Filipinos benefiting from the fishery resources of the vast Philippine EEZ. Instead, commercial fishers have taken advantage of government subsidies and rebates to invest in more powerful gears to fish in municipal waters, contributing immensely to the overfishing problem plaguing many of the country's coastal communities.

The loss of fisheries is having a huge impact on those members of society who have the least opportunities. Low access to basic services, low education levels, low income and “poverty” characterize the socioeconomic condition of virtually all of the country's fishing communities. They are some of the “poorest” segments of the population and, worse, their situation continues to deteriorate.

It is the key resource users – the municipal fishers – who ultimately really need government support. They have little alternative to fishing and are socially and culturally tied to being fishers now and in the foreseeable future. Aquaculture, the modern-day hope for “food security”, has potential when done properly for selected species, but is proving to be expensive and energy-intensive, and often degrades coastal habitats and fisheries.

Small fishers are a major sector. They are not easy to relocate or to provide with alternative employment. Unable to

resolve the problems at the micro community level, they are looking to the government to resolve these at a macro level.

Policymakers and implementers would do well to realize that coastal communities are viable development partners and that the answers to most of the problems for coastal and fisheries management are available within the country. Lack of enforcement of the fisheries laws and poor monitoring and regulation of commercial fishing sector have meant municipal fishers are not enjoying their legal preferential rights to municipal waters. There needs to be a whole-scale acceptance that without some clear government support for small municipal fishers, fishery resources will eventually disappear. If this happens, the social and economic problems affecting coastal communities will only worsen.

It is not too late to recognize the magnitude of the fisheries problems and the policy shifts required to set a new direction. Based on the information at hand, we can begin now!

Glossary

Aquaculture: Fishery operations involving all forms of propagating, raising and breeding fish and other fishery species in fresh, brackish and marine water impoundments.

Catch ceilings: Harvest limits allowed from any fishing area in consideration of the need to prevent overfishing and depletion of breeding stocks of aquatic organisms.

Closed season: Period during which the taking of specified fishery species is prohibited in a specified area or fishing ground.

Coastline: Outline of the mainland shore touching the sea at mean low tide.

Commercial fishing: Taking or catching of fishery species for trade, business or profit using fishing vessels of 3 GT or above.

Ecosystem overfishing: This occurs when the decline of a once abundant fish stock due to fishing results in an ecological imbalance and eventual changes in fishery.

Effective demand: In the classical Keynesian definition, generally refers to the sum of the amount the community is expected to spend on consumption (its propensity to consume) and the amount it is expected to devote to new investment.⁵³

Exclusive economic zone (EEZ): An area beyond and adjacent to the territorial sea which shall not extend beyond 200 nautical miles from the baselines as defined under existing laws.

Fine-mesh net: Net with mesh size of less than 3 cm measured between two opposite knots of a full mesh when stretched or as otherwise determined by the appropriate government agency.

Fish aggregating device (*payao*): A device consisting of a floating structure anchored by a weighted line with suspended materials such as palm fronds to attract pelagic and schooling species of fish.

Fish and fishery/aquatic products: Include not only finfish but also mollusk, crustaceans, echinoderms, marine mammals, other species of aquatic flora and fauna, and products of aquatic living resources in any form.

Fish cage: An enclosure which is either stationary or floating made up of nets or screens sewn or fastened together and installed in the water with opening at the surface or covered and held in place by wooden/bamboo posts or various types of anchors and floats.

Fish corral (*baklad*): An enclosure and barrier contraption made of bamboo stakes, nets and other materials devised to intercept and ultimately capture fish.

Fish pen: An enclosure constructed in a body of water for culturing fish and aquatic animals, made up of poles arranged to prevent escape of fish through screen or nylon netting.

Fish pond: A land-based facility enclosed with earthen or stone material to impound water for growing fish.

Fisherfolk: People directly or personally and physically engaged in taking and/or culturing and processing fishery and/or aquatic resources.

Fishery: Targeted effort to catch a species of fish, and the infrastructure that supports it; any activity relating to the act or business of fishing, culturing, preserving, processing, marketing, developing, conserving and managing aquatic resources and fishery areas, including the privilege to fish or take aquatic resources.

Fishery management area: A bay, gulf or any other fishery area that may be delineated for fishery resource management purposes.

Fishing: Taking of fishery species from their wild state or habitat, with or without the use of fishing vessels.

Fishing boat/gear license: A permit to operate specific types of fishing boat gear for specific duration in areas beyond municipal waters for demersal or pelagic fishery species.

Fishing gear: Any instrument or device and its accessories used in taking fish and other fishery species.

Fishing industry: The fisheries sector covering catching, growing, harvesting, processing, marketing, developing, conserving and managing of aquatic resources.

Food security: Any plan, policy or strategy aimed at ensuring adequate supplies of appropriate food at affordable prices.

Gross domestic product (GDP): Gross national product (total monetary value of all goods and services produced in a country during one year) excluding payments on foreign investments.

Gross tonnage: Includes underdeck tonnage, permanently enclosed spaces above the tonnage deck, except for certain exemptions. In broad terms, all the vessel's "closed-in" spaces expressed in volume terms on the basis of 100 ft³ (= 1 GT).

Growth overfishing: Occurs when fish are caught before they are given the chance to grow to optimum size for harvest.

Limited access: A fishery policy by which a system of equitable resource use and allocation is established by law through fishery rights granting and licensing procedures.

Malthusian overfishing: Occurs when fishers, getting little or no catch and believing they have little choice left, use illegal and destructive fishing gear to improve their catch.

Mangroves: A community of intertidal plants, including all species of trees, shrubs, vines and herbs found on coasts, swamps or border of swamps.

Maximum sustainable yield (MSY): The largest average quantity of harvest from a given fish stock within a period of time that can be sustained under existing conditions.

Migratory species: Any fishery species, which in the course of their life, travel over great distances in waters of the ocean as part of their behavioral adaptation for survival and speciation.

Monitoring, control and surveillance

Monitoring: Requirement of continuously observing: (1) fishing effort, which can be expressed by the number of days or hours of fishing, number of fishing gears and number of fisherfolk; (2) characteristics of fishery resources; and (3) resource yields (catch).

Control: Regulatory conditions (legal framework) under which the exploitation, utilization and disposition of resources may be conducted.

Surveillance: Degree and types of observations required to maintain compliance with regulations.

Municipal fishers: Persons directly or indirectly engaged in municipal fishing and other related fishing activities.

Municipal fishing: Fishing using vessels of 3 GT or less, or not requiring the use of fishing vessels.

Municipal waters: Include not only streams, lakes, inland bodies of water and tidal waters within the municipality which are not included within the protected areas as defined under Republic Act 7586, public forest, timber lands, forest reserves or fishery reserves, but also marine waters included between two lines drawn perpendicular to the general coastline from points where the boundary lines of the municipality touch the sea at low tide and a third line parallel with the general coastline including offshore islands and 15 km from such coastline. Where two municipalities are so situated on opposite shores that there is less than 30 km of marine waters between them, the third line shall be equally distant from opposite shore of the respective municipalities.

Nongovernment organization: An agency, institution, foundation or group of persons whose purpose is to assist peoples' organizations/associations in various ways, including, but not limited to, organizing, education, training, research and/or resource accessing.

Overfishing: Occurs when the quantity of fish harvested causes a net reduction of its population, thereby limiting production from fish stock for the future.

Philippine waters: Include all bodies of water within the Philippine territory, and all other waters over which it has sovereignty and jurisdiction, including the 200-nautical mile EEZ and the continental shelf.

Purse seine: A form of encircling net having a line at the bottom passing through rings attached to the net, which can be drawn or pursed.

Recruitment overfishing: Occurs when the adult fish population is caught in large quantities, such that reproduction is impaired.

Resource rent: Difference between the value of products produced from harvesting a publicly owned resource less the cost of producing it, where cost includes the normal return to capital and normal return to labor.

Threatened species: Refers to species and subspecies of aquatic organisms which have reached a critical level of depletion and are threatened with extinction.

Total allowable catch: Maximum harvest allowed to be taken during a given period of time from any fishery area, or from any fishery species or group of species, or a combination of area and species and normally would not exceed MSY.

Trawl: An active fishing gear consisting of a bag-shaped net with or without otter boards to open its opening, which is dragged or towed along the bottom or through the water column to take fishery species by straining them from the water.

Trophic level: A stage in a food chain that reflects the number of times energy has been transferred through feeding; for example, when plants are eaten by animals that are in turn eaten by predators.

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